NUREG-1838

Safety Evaluation Report
Related to the License Renewal of the Millstone Power Station, Units 2 and 3

Docket Nos. 50-336 and 50-423

Dominion Nuclear Connecticut, Inc.

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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ABSTRACT

This safety evaluation report (SER) documents the technical review of the Millstone Power Station (MPS), Units 2 and 3, license renewal applications (LRAs) by the staff of the U.S. Nuclear Regulatory Commission (NRC) (the staff). By letter dated January 20, 2004, Dominion Nuclear Connecticut, Inc. (Dominion or the applicant) submitted the LRAs for MPS in accordance with Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54). Dominion is requesting renewal of the operating licenses for MPS Units 2 and 3, (Facility Operating License Numbers DPR-65 and NPF-49, respectively) for a period of 20 years beyond the current expiration dates of midnight July 31, 2015, for Unit 2 and midnight November 25, 2025, for Unit 3.

The MPS units are located on an approximately 500-acre site in the town of Waterford, CT, on the north shore of Long Island Sound. The NRC issued the construction permits for MPS Units 2 and 3 on December 12, 1970, and August 9, 1974, respectively. The operating licenses were issued by the NRC on September 26, 1975, for Unit 2 and January 31, 1986, for Unit 3. MPS Unit 2 consists of a two-steam-generator, four-coolant-loop, pressurized-light-water-reactor, with a nuclear steam supply system supplied by Combustion Engineering, Inc. and a turbine generator furnished by General Electric Corporation. The balance of the plant was originally designed and constructed by Northeast Nuclear Energy Company with the assistance of its agent, Bechtel Corporation. Unit 2 was designed to generate 2560 megawatt thermal (MWt), or approximately 865 megawatt electric (MWe), but in 1979, the unit was uprated to a core power output of 2700 MWt with a gross electrical output of approximately 895 MWe. MPS Unit 3 consists of a four-steam-generator, four-coolant-loop, pressurized-light-water-reactor, with a nuclear steam supply system supplied by Westinghouse Electric Corporation and a turbine generator furnished by General Electric Corporation. The balance of the plant was originally designed and constructed by Northeast Nuclear Energy Company with the assistance of its agent, Stone and Webster Corporation. MPS Unit 3 operates at a licensed power output of 3411 MWt, with a gross electrical output of approximately 1195 MWe.

This SER presents the status of the staff's review of information submitted to the NRC through July 22, 2005, the cutoff date for consideration in the SER. The staff identified open items and confirmatory items that had to be resolved before the staff could make a final determination on the application. Sections 1.5 and 1.6 of this report summarize these items and their resolutions. Section 6 provides the staff's final conclusion on the review of the MPS LRAs.

The NRC license renewal project manager is Mr. Johnny H. Eads. Mr. Eads may be reached at (301) 415-1471. Written correspondence should be addressed to the License Renewal and Environmental Impacts Program, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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ABBREVIATIONS

ΔRT_{NDT}	irradiation induced shift in the reference nil ductility transition temperature
AAC	alternate alternating current
AC	air conditioning or alternating current
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ACSR	aluminum conductor steel reinforced
AERM	aging effects requiring management
AFW	auxiliary feedwater
AHU	air handling unit
AISC	American Institute of Steel Construction
AMP	aging management program
AMR	aging management review
AMSAC	ATWS mitigating system actuating circuitry
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
B&PV	boiler and pressure vessel
B&W	Babcock and Wilcox
BMI	bottom-mounted instrumentation
BTP	branch technical position
BWR	boiling-water reactor
CASS	cast austenitic stainless steel
CCC	computer code collection
CE	Combustion Engineering
CEA	control element assembly
CEDM	control element drive mechanism
CEOG	Combustion Engineering Owners Group
CFR	*Code of Federal Regulations*
CFS	cubic feet per second
CI	confirmatory item
CF	chemistry factor
CL&P	Connecticut Light & Power
CLB	current licensing basis
CMAA	Crane Manufacturers Association of America
CO_2	carbon dioxide
CR	condition report
CRD	control rod drive
CRDM	control rod drive mechanism
CSPE	chloro-sulfonated polyethylene
CUF	cumulative usage factor
CVCS	chemical and volume control system
CVPS	Central Vermont Public Service Corporation

Cv_{use}	charpy upper shelf energy
DBA	design-basis accident
DBE	design-basis earthquake
DBS	design-basis summary
DC	direct current
DG	draft regulatory guide
DOR	Division of Reactors
DOTIV	discrete ordinates transport code
DSS	diverse scram system
DWST	demineralized water storage tank
ECT	eddy current testing
EDG	emergency diesel generator
EEQ	electrical equipment qualification
EFPD	effective full power days
EFPH	effective full power hours
EFPY	effective full power year
ELD	electronic licensing documentation database
EOC	electric overhead crane
EOL	end of life
EPDM	ethylene propylene diene monomer
EPR	ethylene propylene rubber
EPRI	Electric Power Research Institute
EQ	environmental qualification
EQML	equipment qualification master list
EQR	environmental qualification report
ER	Environmental Report (10 CFR 51)
ESF	engineered safety feature
ETA	ethanolamine
FAC	flow accelerated corrosion
FHA	fire hazards analysis
FMP	fatigue monitoring program
FP	fire protection
FPER	fire protection evaluation report
FSAR	final safety analysis report
GALL	NUREG-1801, "Generic Aging Lessons Learned Report"
GDC	general design criterion
GDLS	guidelines
GEIS	generic environmental impact statement
GL	generic letter
GPM	gallons per minute
GRITS	generation records information tracking system
GSI	generic safety issue
GTR	generic technical report
HELB	high-energy line break
HMWPE	high molecular weight polyethylene
HVAC	heating, ventilation, and air conditioning
HPSI	high pressure safety injection
IASCC	irradiation-assisted stress corrosion cracking
ICI	incore instrumentation

IEEE	Institute of Electrical and Electronics Engineers
ID	inner diameter
IGSCC	intergranular stress corrosion cracking
ILRT	integrated leak-rate test
IN	information notice
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
IR	insulation resistance
ISG	interim staff guidance
ISI	inservice inspection
I&C	instrumentation and controls
IWB	requirements for Class 1 components of light-water cooled power plants
IWC	requirements for Class 2 components of light-water cooled power plants
IWD	requirements for Class 3 components of light-water cooled power plants
kV	kilovolt
LBB	leak before break
LCO	limiting condition for operation
LCR	load center room
LER	licensee event report
LLRT	local leak rate testing
LOCA	loss-of-coolant accident
LPSI	low pressure safety injection
LR	license renewal
LRA	license renewal application
LRIMS	license renewal information management system
LSI	limited structural integrity
LTOP	low temperature overpressurization protection
MAER	material aging effects report
MCC	motor control center
MCL	main coolant line
MEAP	material, environment, aging effects, and aging management program
MEPL	materials and equipment parts list
MIC	microbiologically induced corrosion
MMOD	minor modification
MMWEC	Massachusetts Municipal Wholesale Electric Company
MNSA	mechanical nozzle seal assembly
MOV	motor operated valve
MPS	Millstone Power Station
MR	Maintenance Rule
MRP	materials reliability program
MRRF	Millstone Radwaste Reduction Facility
MSL	mean sea level
MSLB	main steam line break
MSRC	Management Safety Review Committee
MSVB	main steam valve building
MW	megawatt
MWe	megawatts-electrical
MWt	megawatt-thermal
NACE	National Association of Corrosion Engineers

NCFM	nuclear component fatigue management
NDE	non-destructive examination
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NPRDS	nuclear plant reliability data system
NRC	U.S. Nuclear Regulatory Commission
NSAC	Nuclear Safety Analysis Center
NSR	non-safety-related
NS>SR	non-safety-related affecting safety-related
NSSS	nuclear steam supply system
OBE	operating basis earthquake
ODSCC	outside diameter stress corrosion cracking
OE	operating experience
OI	open item
PAID	piping and instrumentation diagram
PB	pressure boundary
PCM	personnel contamination monitor
PDT	primary drain tank
PLL	predicted lower limit
PM	preventive maintenance
PMMS	production maintenance management system
PNNL	Pacific Northwest National Laboratory
PPB	parts per billion
PPM	parts per million
PRA	probabilistic risk assessment
P-T	pressure-temperature
PTS	pressurized thermal shock
PVC	polyvinyl chloride
PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
QA	quality assurance
QAP	quality assurance program
QC	quality control
QDR	qualification document review
RAI	request for additional information
RBCCW	reactor building closed cooling water system
RCCA	rod cluster control assembly
RCD	regulatory commitment database
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RFO	refueling outage
RHR	residual heat removal
RPCC	reactor plant component cooling
RI-ISI	risk informed - inservice inspection
RG	regulatory guide
RPV	reactor pressure vessel
RSST	reserve station service transformer

RT	radiography testing
RTD	resistance temperature detector
RT_{NDT}	reference nil ductility transition temperature
RT_{PTS}	reference temperature for pressurized thermal shock
RV	reactor vessel
RVHP	reactor vessel head penetration
RVI	reactor vessel internals
RVID	reactor vessel integrity database
RVSP	reactor vessel surveillance program
RWST	refueling water storage tank
SAMA	severe accident mitigation alternative
SBO	station blackout
SC	structure and component
SCBA	self contained breathing apparatus
SCC	stress corrosion cracking
SDC	shutdown cooling
SER	safety evaluation report
SFRM	safety function requirements manual
SG	steam generator
SGFP	steam generator feedwater pump
SGSIP	steam generator structural integrity program
SI	safety injection
SIAS	safety injection actuation signal
SPCS	steam and power conversion systems
SR	safety-related
SRP	Standard Review Plan
SRP-LR	NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants”
SSC	structures, systems, and components
SVI	single volumetric indication
SW	service water
SWGR	switchgear
t	thickness
TBCCW	turbine building closed cooling water
TGSCC	transgranular stress corrosion cracking
TIC	temperature indicating controllers
TLAA	time-limited aging analysis
TRM	technical requirements manual
TS	technical specification
TSCR	technical specification change request
TSP	trisodium phosphate dodecahydrate
USE	upper shelf energy
UT	ultrasonic testing
UV	ultraviolet
VAC	voltage alternating current
VETIP	vendor equipment technical information program
VT	visual test
WINCDMS	chemistry data management system
WOG	Westinghouse Owners Group
XLPE	cross-linked polyethylene

SECTION 1

INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a safety evaluation report (SER) on the applications for license renewal for the Millstone Power Station (MPS), as filed by the Dominion Nuclear Connecticut, Inc. (Dominion or the applicant). By letter dated January 20, 2004, Dominion submitted its applications to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the MPS operating licenses for an additional 20 years. The NRC staff (the staff) prepared this report, which summarizes the results of its safety review of the renewal applications for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations*, (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The NRC license renewal project manager for the MPS license renewal review is Johnny Eads. Mr. Eads can be contacted by telephone at 301-415-1471 or electronic mail at jhe@nrc.gov. Alternatively, written correspondence may be sent to the following address:

License Renewal and Environmental Impacts Program
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attention: Johnny Eads, Mail Stop 0-11 F1

In its January 20, 2004, submittal letter, the applicant requested renewal of the operating licenses issued under Section 104b (Operating License No. DPR-65) and Section 103 (Operating License No. NPF-49) of the Atomic Energy Act of 1954, as amended, for MPS Units 2 and 3, respectively, for a period of 20 years beyond the current license expiration dates of midnight, July 31, 2015, for Unit 2 and November 25, 2025, for Unit 3. The MPS units are located on an approximately 500-acre site in the town of Waterford, CT, on the north shore of Long Island Sound. The NRC issued the construction permit for Unit 2 on December 11, 1970, and for Unit 3 on August 9, 1974. The NRC issued the operating license for Unit 2 on September 26, 1975, and for Unit 3 on January 31, 1986. MPS Unit 2 consists of a two-steam-generator, four-coolant-loop, pressurized-light-water-reactor, with a nuclear steam supply system supplied by Combustion Engineering, Inc. and a turbine generator furnished by General Electric Corporation. The balance of the plant was originally designed and constructed by Northeast Nuclear Energy Company with the assistance of its agent Bechtel Corporation. Unit 2 was designed to generate 2560 megawatt thermal (MWt), or approximately 865 megawatt electric (MWe), but in 1979 the unit was uprated to a core power output of 2700 MWt, with a gross electrical output of approximately 895 MWe. MPS Unit 3 consists of a four-steam-generator, four-coolant-loop, pressurized-light-water-reactor, with a nuclear steam supply system supplied by Westinghouse Electric Corporation and a turbine generator furnished by General Electric Corporation. The balance of the plant was originally designed and constructed by Northeast Nuclear Energy Company with the assistance of its agent, Stone and Webster Corporation. Unit 3 operates at a licensed power output of 3411 MWt, with a gross electrical output of approximately 1195 MWe. The final safety analysis report (FSAR) contains details concerning the plant and the site.

The license renewal process consists of two concurrent reviews—a technical review of safety issues and an environmental review. The NRC regulations found in 10 CFR Parts 54 and 51, respectively, set forth the requirements for these reviews. The safety review for the MPS license renewal is based on the applicant's license renewal applications (LRAs) and on the responses to the staff's requests for additional information (RAIs). The applicant supplemented and clarified its responses to the LRA and RAIs in audits, meetings, and docketed correspondence. Unless otherwise noted, the staff reviewed and considered information submitted through July 22, 2005. The staff reviewed information received after that date on a case-by-case basis, depending on the stage of the safety review and the volume and complexity of the information. The public may review the LRA and all pertinent information and materials, including the FSAR mentioned above at the NRC Public Document Room, located in One White Flint North, 11555 Rockville Pike (first floor), Rockville, MD 20852-2738 (301-415-4737/800-397-4209), and at the Waterford Public Library, 49 Rope Ferry Road, Waterford, CT 06385-2806, and at the Three Rivers Community College, Thames River Campus, 574 New London Turnpike, Norwich, CT 06360. In addition, the public may find the MPS Units 2 and 3 LRAs, as well as materials related to the license renewal review, on the NRC website at www.nrc.gov.

This SER summarizes the results of the staff's safety review of the MPS LRA and describes the technical details considered in evaluating the safety aspects of the units' proposed operation for an additional 20 years beyond the term of the current operating licenses. The staff reviewed the LRA in accordance with NRC regulations and the guidance provided in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," (SRP-LR), dated July 2001.

Sections 2 through 4 of this SER address the staff's review and evaluation of license renewal issues that it has considered during the review of the application. Section 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this report are in Section 6.

Appendix A to this SER is a table that identifies the applicant's commitments associated with the renewal of the operating licenses. Appendix B provides a chronology of the principal correspondence between the NRC and the applicant related to the review of the application. Appendix C is a list of principal contributors to the SER. Appendix D is a bibliography of the references used in support of the review.

In accordance with 10 CFR Part 51, the staff prepared a plant-specific supplement to the Generic Environmental Impact Statement (GEIS). This supplement discusses the environmental considerations related to renewing the licenses for MPS Units 2 and 3. The NRC staff issued Supplement 22 to NUREG-1437 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Millstone Power Station, Units 2 and 3 Final Report," on July 18, 2005.

1.2 <u>License Renewal Background</u>

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, operating licenses for commercial power reactors are issued for 40 years. These licenses can be renewed for up to 20 additional years. The original 40-year license term was selected on the basis of economic and antitrust considerations, rather than on technical limitations. However, some individual plant and equipment designs may have been engineered on the basis of an expected 40-year service life.

In 1982, the NRC anticipated interest in license renewal and held a workshop on nuclear power plant aging. This workshop led the NRC to establish a comprehensive program plan for nuclear plant aging research. On the basis of the results of that research, a technical review group concluded that many aging phenomena are readily manageable and do not pose technical issues that would preclude life extension for nuclear power plants. In 1986, the NRC published a request for comment on a policy statement that would address major policy, technical, and procedural issues related to license renewal for nuclear power plants.

In 1991, the NRC published the license renewal rule in 10 CFR Part 54 (the Rule). The NRC participated in an industry-sponsored demonstration program to apply the Rule to a pilot plant and to gain experience necessary to develop implementation guidance. To establish a scope of review for license renewal, the Rule defined age-related degradation unique to license renewal. However, during the demonstration program, the NRC found that many aging mechanisms occur and are managed during the period of initial license. In addition, the NRC found that the scope of the review did not allow sufficient credit for existing programs, particularly the implementation of the Maintenance Rule, which also manages plant-aging phenomena. As a result, the NRC amended the license renewal rule in 1995. The amended 10 CFR Part 54 established a regulatory process that is simpler, more stable, and more predictable than the previous license renewal rule. In particular, the NRC amended 10 CFR Part 54 to focus on managing the adverse effects of aging rather than on identifying age-related degradation unique to license renewal. The NRC initiated these rule changes to ensure that important systems, structures, and components (SSCs) will continue to perform their intended functions during the period of extended operation. In addition, the revised Rule clarified and simplified the integrated plant assessment (IPA) process to be consistent with the revised focus on passive, long-lived structures and components (SCs).

In parallel with these efforts, the NRC pursued a separate rulemaking effort and developed an amendment to 10 CFR Part 51 to focus the scope of the review of environmental impacts of license renewal and fulfill the NRC's responsibilities under the National Environmental Policy Act of 1969 (NEPA).

1.2.1 Safety Review

License renewal requirements for power reactors are based on two key principles:

(1) The regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety, with the possible exception of the detrimental effects of aging on the functionality of certain SSCs during the period of extended operation, as well as a few other issues related to safety during the period of extended operation.

(2) The plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term.

In implementing these two principles, 10 CFR 54.4 defines the scope of license renewal as including those SSCs (1) that are safety-related; (2) whose failure could affect safety-related functions; and (3) that are relied on to demonstrate compliance with the NRC's regulations for fire protection (FP), environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transient without scram (ATWS), and station blackout (SBO).

Pursuant to 10 CFR 54.21(a), an applicant for a renewed license must review all SSCs that are within the scope of the Rule to identify SCs that are subject to an aging management review (AMR). Those SCs that are subject to an AMR perform an intended function without moving parts or without a change in configuration or properties, and are not subject to replacement based on qualified life or specified time period. As required by 10 CFR 54.21(a), an applicant for a renewed license must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of those SCs will be maintained, consistent with the current licensing basis (CLB), for the period of extended operation. Active equipment, however, is considered to be adequately monitored and maintained by existing programs. In other words, the detrimental effects of aging that may affect active equipment are more readily detectable and can be identified and corrected through routine surveillance, performance monitoring, and maintenance activities. The surveillance and maintenance activities programs for active equipment, as well as other aspects of maintaining the plant design and licensing basis, are required throughout the period of extended operation.

Pursuant to 10 CFR 54.21(d), each LRA is required to include a supplement to the FSAR. This FSAR supplement must contain a summary description of the applicant's programs and activities for managing the effects of aging and the evaluation of time-limited aging analyses (TLAAs) for the period of extended operation.

License renewal also requires the identification and updating of the TLAAs. During the design phase for a plant, certain assumptions are made about the length of time the plant can operate. These assumptions are incorporated into design calculations for several of the plant's SSCs. In accordance with 10 CFR 54.21(c)(1), the applicant must either show that these calculations will remain valid for the period of extended operation, project the analyses to the end of the period of extended operation, or demonstrate that the effects of aging on these SSCs can be adequately managed for the period of extended operation.

In 2001, the NRC developed and issued Regulatory Guide (RG) 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses." This RG endorses NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," which was issued in March 2001 by the Nuclear Energy Institute (NEI). NEI 95-10 details an acceptable method of implementing the license renewal rule. The NRC also used the SRP-LR to review this application.

In the LRA, MPS fully utilizes the process defined in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," issued in July 2001. The GALL Report provides the staff with a summary of staff-approved aging management programs (AMPs) for the aging of many SCs that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA can be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used throughout the industry. The report also serves as a reference for both applicants and staff reviewers to quickly identify those AMPs and activities that the staff has determined can provide adequate aging management during the period of extended operation.

1.2.2 Environmental Review

In December 1996, the staff revised the environmental protection regulations to facilitate the environmental review for license renewal. The staff prepared a "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" (NUREG-1437, Revision 1) to document its evaluation of the possible environmental impacts associated with renewing licenses of nuclear power plants. For certain types of environmental impacts, the GEIS establishes generic findings that are applicable to all nuclear power plants. These generic findings are codified in Appendix B to Subpart A of 10 CFR Part 51. Pursuant to 10 CFR 51.53(c)(3)(i), an applicant for license renewal may incorporate these generic findings in its environmental report. In accordance with 10 CFR 51.53(c)(3)(ii), an environmental report must also include analyses of those environmental impacts that must be evaluated on a plant-specific basis (i.e., Category 2 issues).

In accordance with NEPA and the requirements of 10 CFR Part 51, the NRC performed a plant-specific review of the environmental impacts of license renewal, including whether new and significant information existed that the GEIS did not consider. As part of its scoping process, the NRC held a public meeting on May 18, 2004, in Waterford, CT, to identify environmental issues specific to the plant. The NRC held another public meeting on January 11, 2005, in Waterford, CT, to discuss the draft plant-specific Supplement 22 to the MPS Units 2 and 3, GEIS. The NRC's plant-specific Supplement 22 to the MPS Units 2 and 3, GEIS, which was issued on July 18, 2005, documents the results of the environmental review and includes a recommendation with respect to the license renewal action.

1.3 <u>Principal Review Matters</u>

Title 10, Part 54, of the *Code of Federal Regulations* describes the requirements for renewing operating licenses for nuclear power plants. The staff performed its technical review of the MPS LRA in accordance with Commission guidance and the requirements of 10 CFR Part 54. Title 10, Section 54.29 of the *Code of Federal Regulations* sets forth the standards for renewing a license. This SER describes the results of the staff's safety review.

In 10 CFR 54.19(a), the Commission requires a license renewal applicant to submit general information. The applicant provided this general information in Section 1 of its LRA for MPS Units 2 and 3, which it submitted to the NRC by letter dated January 20, 2004. The staff reviewed Section 1 and finds that the applicant has submitted the information required by 10 CFR 54.19(a).

In 10 CFR 54.19(b), the Commission requires that each LRA include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The applicant stated the following in each LRA regarding this issue:

> The current indemnity agreement for the unit does not contain a specific expiration term for the operating licenses. Therefore, conforming changes to account for the expiration term of the proposed renewed licenses are not necessary, unless the license numbers are changed upon issuance of the renewed licenses.

The staff intends to maintain the original license numbers upon issuance of the renewed licenses. Therefore, conforming changes to the indemnity agreement do not need to be made, and the requirements of 10 CFR 54.19(b) have been met.

In 10 CFR 54.21, the Commission requires that each LRA must contain (a) an IPA, (b) a description of any CLB changes that occurred during staff review of the LRA, (c) an evaluation of TLAAs, and (d) an FSAR supplement. Sections 3 and 4 and Appendix B to the LRA address the license renewal requirements of 10 CFR 54.21(a), (b), and (c). Appendix A to the LRA contains the license renewal requirements of 10 CFR 54.21(d).

In 10 CFR 54.21(b), the Commission requires that each year following submission of the LRA, and at least 3 months before the scheduled completion of the staff's review, the applicant must submit an amendment to the renewal application that identifies any changes to the CLB of the facility that materially affect the contents of the LRA, including the FSAR supplement. The applicant submitted an update to the LRA by letter dated January 12, 2005, which summarized the changes to the CLB that have occurred at MPS Units 2 and 3, during the staff's review of the LRA. This submission satisfies the requirements of 10 CFR 54.21(b) and is still under staff review.

In accordance with 10 CFR 54.22, an applicant's LRA must include changes or additions to the technical specifications (TS) that are necessary to manage the effects of aging during the period of extended operation. In Appendix D to the LRA, the applicant stated that it had not identified any TS changes necessary to support issuance of the renewed operating licenses for MPS Units 2 and 3. This adequately addresses the requirement specified in 10 CFR 54.22.

The staff evaluated the technical information required by 10 CFR 54.21 and 10 CFR 54.22 in accordance with NRC regulations and the guidance provided by the SRP-LR. Sections 2, 3, and 4 of this SER document the staff's evaluation of the technical information contained in the LRA.

The staff's evaluation of the environmental information required by 10 CFR 54.23 is contained in the final plant-specific supplement to the GEIS which states the considerations related to renewing the licenses for MPS Units 2 and 3. This supplement was prepared by the staff separate from this SER. As required by 10 CFR 54.25, the ACRS issued a report to document its evaluation of the staff's LRA review and associated SER. Section 5 of this SER incorporates the ACRS report. The findings required by 10 CFR 54.29 can be found in Section 6 of this SER.

1.4 Interim Staff Guidance

The license renewal program is a living program. The NRC staff, industry, and other interested stakeholders gain experience and develop lessons learned with each renewed license. The lessons learned address the NRC's performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. Interim staff guidance (ISG) is documented for use by the NRC staff, industry, and other interested stakeholders until it is incorporated into the license renewal guidance documents such as the SRP-LR and GALL report.

The following table provides the current set of ISGs issued by the staff, as well as the SER sections in which the staff addresses ISG issues.

ISG Issue (Approved ISG No.)	**Purpose**	**SER Section**
GALL report presents one acceptable way to manage aging effects **(ISG-1)**	This ISG clarifies that the GALL report contains one acceptable way, but not the only way, to manage aging for license renewal.	N/A
SBO Scoping **(ISG-2)**	The license renewal rule 10 CFR 54.4(a)(3) includes 10 CFR 50.63(a)(1)—SBO. The SBO rule requires that a plant must withstand and recover from an SBO event. The recovery time for offsite power is much faster than that of EDGs. The offsite power system should be included within the scope of license renewal.	2.1.3.1.1
Concrete AMP **(ISG-3)**	Lessons learned from the GALL demonstration project indicated that GALL is not clear on whether concrete requires an AMP.	3.5A.2.2.1.1 3.5B.2.2.1.1

ISG Issue (Approved ISG No.)	Purpose	SER Section
FP System Piping **(ISG-4)**	This ISG clarifies the staff position for wall-thinning of the FP piping system in GALL AMPs XI.M26 and XI.M27. The staff's new position is that there is no need to disassemble FP piping, as disassembly can introduce oxygen to FP piping, which can accelerate corrosion. Instead, use a non-intrusive method, such as volumetric inspection. Testing of sprinkler heads should be performed at year 50 of sprinkler system service life, and every 10 years thereafter. This ISG eliminates the Halon/carbon dioxide system inspections for charging pressure, valve line-ups, and the automatic mode of operation test from GALL; the staff considers these test verifications to be operational activities.	3.0.3.2.7

ISG Issue (Approved ISG No.)	Purpose	SER Section
Identification and Treatment of Electrical Fuse Holders **(ISG-5)**	This ISG includes electrical fuse holders AMR and AMP (i.e., same as terminal blocks and other electrical connections). The position includes only fuse holders that are not inside the enclosure of active components (e.g., inside of switchgears and inverters). Operating experience finds that metallic clamps (spring-loaded clips) have a history of age-related failures from aging stressors such as vibration, thermal cycling, mechanical stress, corrosion, and chemical contamination. The staff finds that visual inspection of fuse clips is not sufficient to detect the aging effects from fatigue, mechanical stress, and vibration.	2.1.3.2.3 3.0.3.2.5
The ISG Process **(ISG-8)**	This ISG provides clarification and update to the ISG process on Improved License Renewal Guidance Documents.	N/A
Standardized Format for License Renewal Applications **(ISG-10)**	The purpose of this ISG is to provide a standardized license renewal application format for applicants.	N/A

1.5 Summary of Open Items

As a result of its review of the LRA for MPS Units 2 and 3, including additional information submitted to the NRC through February 15, 2005, the staff identified six open issues that remained open at the time the SER with Open Items was published. An issue was considered open if the applicant had not presented a sufficient basis for resolution. Each open item (OI) had been assigned a unique identifying number. By letters dated April 1, 2005, June 2, 2005, July 14, 2005, and July 21, 2005, the applicant responded to these open items. The staff reviewed these responses and has closed out each of the open items. The basis for closing the open items is as follows:

OI-2.1.3-1 (Section 2.1.3.1.1 - Application of the Scoping Criteria in 10 CFR 54.4(a))

In RAI 2.1-1, the staff requested additional information regarding the scoping methodology associated with the 10 CFR 54.4(a)(2) evaluation. The staff requested that the applicant define the term “first equivalent anchor point” as it relates to the evaluation of NSR piping attached to SR piping and describe the methodology of its application. Additionally, in cases where plant equipment credited with providing support to NSR piping within the scope of license renewal may be equivalent to an associated piping anchor as described in NUREG-1800, the staff requested that the applicant provide justification for not including this plant equipment within the scope of license renewal. The applicant’s November 9, 2004, response to the RAI stated that for the purpose of license renewal, the first equivalent anchor is defined as when the piping has been restrained in each of the three orthogonal directions. The response also recognized that, in some cases, plant equipment may be credited as providing restraint in one or more directions in the piping system seismic evaluation. Dominion stated that in these cases, the credited components are also included within the scope of license renewal. The applicant applied the six criteria in the determination of the license renewal boundary endpoints for NSR piping attached to SR piping. However, the staff had concerns with the criteria’s consistency with the CLB and whether the criteria established by the applicant would conservatively bound the equivalent anchor. This was identified as Open Item 2.1.3-1.

In response to Open Item 2.1.3-1, the applicant provided additional information to the staff on April 1, 2005, regarding the basis of the six bounding criteria used in the determination of the license renewal boundary endpoints for NSR piping attached to SR piping. The applicant stated that the bounding criteria provided assurance that the license renewal scoping boundary would envelop the scope of the NS piping system included in the design basis seismic analysis, consistent with the CLB, and in some cases, the bounding approach resulted in an overly conservative license renewal boundary determination. The applicant also provided the staff with a revised definition of an equivalent anchor to be used for the purposes of identifying the NS piping in the scope of license renewal during the case-by-case reviews. The revised definition was changed from one restraint in each of the three orthogonal directions to two restraints. A review was performed by the applicant to apply this equivalent anchor definition to the cases where the LR boundary endpoint was previously determined through piping analysis/isometric drawing review or plant walkdown. The applicant stated that as a result, the LR boundary was extended where necessary to include additional supports and portions of piping systems; however, there were no additional component types as a result of these boundary extensions.

Based on the above discussion, the staff concludes that the applicant has supplied sufficient information to demonstrate that SSCs, that meet the scoping requirements of 10 CFR 54.4(a)(2), have been identified as being within the scope of license renewal. Therefore, Open Item 2.1.3-1 is considered closed.

OI-3.0.3.2.18-1 (Section 3.0.3.2.18 - Bolting Integrity Program)

The applicant states that the bolting integrity program is consistent with the aging management program described in GALL AMP XI.M18, with the following exception related to loss of preload. The applicant states that the operating temperature for all other in scope bolted connections are well below the threshold temperature at which stress relaxation of pressure boundary bolting would occur. The staff found that other factors such as vibration can contribute to loss of preload. The applicant needed to address other factors which can contribute to loss of preload and justify if loss of preload is an aging effect requiring management for all bolting within the scope of license renewal. This was identified as Open Item 3.0.3.2.18-1.

In response to Open Item 3.0.3.2.18-1, dated June 29, 2005, the applicant stated the Millstone bolting integrity AMP has now been revised to manage loss of preload as an applicable aging effect for all in-scope bolting. Based on this change to the bolting integrity AMP, Open Item 3.0.3.2.18-1 is closed.

OI-3.0.3.2.18-2 (Section 3.0.3.2.18 - Bolting Integrity Program)

The procedures for ensuring bolting integrity at Millstone identify inspection requirements and general practices for in scope bolting that are consistent with the bolting recommendations identified in Section XI.M18, but do not directly reference EPRI NP-5769 or NUREG-1339 as applicable source documents for these recommendations. However, the Millstone procedures do reference and incorporate the good bolting practices identified in EPRI NP-5067. EPRI NP-5769 and EPRI NP-5067 are very closely related documents that cross-reference one another and reference NUREG-1339. The staff requested clarification on how the guidance in EPRI NP-5067 and EPRI NP-104213 meets the intent of EPRI NP-5769 and NUREG-1339 as identified in GALL AMP XI.M18. This was identified as Open Item 3.0.3.2.18-2.

By letter dated April 1, 2005, the applicant provided a comparison of EPRI NP-5769 and EPRI NP-5067 as they relate to the bolting integrity program at Millstone. In summary, the Millstone bolting integrity program is consistent with the recommendations in NUREG-1801, Section XI.M18. The comparison provided by the applicant demonstrates that EPRI NP-5067 provides adequate guidance for addressing the bolting integrity for Millstone Units 2 and 3. Therefore, Open Item 3.0.3.2.18-2 is closed.

OI-3.1.2-6 (Section 4.1.2.4.2 - Reactor Vessel Internals)

Leakage flow past the inner reactor vessel flange O-ring is limited in the event of seal failure by the 3/16 inch-diameter hole in the reactor vessel flange, which is smaller than the inside diameter of the leak detection line. Additionally, the potential flowrate through the 3/16 inch-diameter hole in the flange is within the normal make-up capability of the chemical and volume control system such that the leak detection system does not constitute the reactor coolant system (RCS) pressure boundary. The failure of the leak detection system components has been evaluated and cannot affect the function of safety related systems, structures or components. As such, the applicant determined that the reactor vessel flange seal leak detection system, including the leak detection line, does not meet the criteria of 10 CFR 54.4(a) and is not within the scope of license renewal. Therefore, the system is not subject to aging management review and there is no aging management program applicable to the leak detection line. The staff review of this position was identified as Open Item 3.1.2-6.

In response to Open Item 3.1.2-6, in a letter dated April 1, 2005, the applicant revised its position and has now included the leak detection components within the scope of license renewal. In addition, the applicant stated that the leak detection system consists of piping, tubing, and valves that are long-lived, passive components and are consistent with the existing component types in the reactor coolant system included in LRA Table 2.3.1-3. These stainless steel components are exposed to a treated water environment and are managed for loss of material and cracking aging effects by the chemistry program for primary systems AMP and the inservice inspection program: systems, components, and supports as indicated for piping, tubing, and valve component types in LRA Table 3.1.2-3. The applicant noted that the loss of fracture toughness aging effect listed in Table 3.2.1-3 is not applicable to these valves since the valves are not CASS.

Based on the applicant's inclusion of the leak detection components within the scope of license renewal, Open Item 3.1.2-6 is closed

OI-4.7.3-1(a) (Section 4.7.3 - Reactor Coolant Pump Code Case N-481)

In response to RAI 4.7.3-1(a), in a letter dated December 3, 2004, the applicant stated that a fracture mechanics evaluation, performed as a part of a Combustion Engineering Owners Group CEN-412, Revision 2, Supplement 2 activity, has been performed for the Millstone Unit 2 reactor coolant pumps. The applicant also stated that for Millstone Unit 2, the limiting end-point crack size is 0.39t, significantly greater than the 1/4t flaw postulated in ASME Code Case N–481. The time for the Millstone Unit 2 reactor coolant pump casing to reach the limiting end-point crack size is 103 years. To confirm the methodology and fracture mechanics results, the staff requested that the applicant provide the fracture mechanics evaluation for staff review. This was identified as Open Item 4.7.3-1(a).

In response to RAI 4.7.3-1(a), dated February 8, 2005, the applicant provided CEN-412, Revision 2, Supplement 2. The staff reviewed the report and found the evaluation used a non-conservative fracture toughness value of 150.4 ksi √in. Using the methodology in the report, along with the staff established fracture toughness value of 82 ksi √in, based on the staff's letter to NEI, dated May 19, 2000, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components," the staff determined that the time required to reach the limiting end-point crack size is 87 years, instead of 103 years. Since this bounds the extended period of operation, the staff finds that the Millstone, Unit 2 reactor coolant pump casing to have adequate toughness for the extended period of operation based on CEN-412, Revision 2, Supplement 2 and the staff's letter dated May 19, 2000. The applicant also submitted an additional supplemental response in a letter dated June 2, 2005, to clarify how it intends to manage the aging of its RCP casings through the period of extended operation. In the June 2, 2005, letter, the applicant stated that the RCP casings will be managed through inspections performed under the aging management program, "Inservice Inspection Program: Systems, Components and Supports," in accordance with 10 CFR 54.21(c)(1)(iii). The staff finds the applicant's management of thermal aging embrittlement using the ASME Code Case N-481 inspection requirements, which consist of a visual inspection, acceptable. This resolves Open Item 4.7.3-1(a).

OI-4.7.4-1 (Section 4.7.4 - Reactor coolant system piping leak-before-break)

For Millstone Unit 2, the applicant reviewed and found the number and characteristics of cycles identified in the leak-before-break (LBB) topical report (CEN-367-A) to be acceptable for the period of extended operation for the RCS piping. The applicant needed to identify all other systems or sections of piping that are covered by LBB analyses and if the analyses are applicable for the period of extended operation. The applicant needed to provide documented justification that the LBB analyses for systems covered by LBB analyses remain valid for the period of extended operation. The applicant needed to also provide justification that the analyses have been projected to the end of the period of extended operation, or that the effects of aging on the intended functions of the systems covered by LBB analyses will be adequately managed for the period of extended operation. The applicant needed to also update the FSAR supplement as appropriate. This was identified as Open Item 4.7.4-1.

By letter dated February 8, 2005, the applicant provided additional information to address Open Item 4.7.4-1. For Millstone Unit 2, the systems and components that have been analyzed for LBB include the reactor coolant loop piping (hot leg, cold leg, and crossover piping), the pressurizer surge line, and portions of the safety injection and shutdown cooling systems. The applicant stated that each of the LBB analyses associated with these systems and components were evaluated for the period of extended operation. The discussion for the reactor coolant loop piping is intended to envelop all of the current design basis LBB analyses. The materials evaluated for the subject components include carbon and low alloy steels, stainless steel (including cast austenitic stainless steel (CASS)) and nickel-based alloys. For each LBB analysis, the inputs to the evaluation were reviewed to identify time-limited assumptions. Thermal aging of CASS materials and fatigue crack growth calculations were determined to be time-based inputs as defined in 10 CFR 54.3 and required evaluation for the period of extended operation. The TLAA evaluations of metal fatigue are discussed in LRA Section 4.3.1 and the staff's evaluation is provided in Section 4.3 of this report. The metal fatigue TLAA evaluations conclude that design-basis limits are not exceeded for ASME Class 1 components (which envelops the components evaluated for LBB) through the period of extended operation. Thermal aging of CASS materials for components that have been evaluated for LBB has been evaluated for its effect on fracture toughness. The applicant's review concluded that the analysis used fully aged values for fracture toughness. Corrosion of nickel-based alloys was also considered. Cracking due to PWSCC of nickel-based alloys is managed by the inservice inspection program: systems, components, and supports AMP described in LRA Section B2.1.18. Millstone Unit 2 has committed to follow the industry recommendations related to nickel-based alloys. This commitment is identified in Appendix A, Table A6.0-1, License Renewal commitments, Item 14. The staff finds that the applicant provided an adequate demonstration that the TLAA for LBB evaluations for the subject components remain valid or have been projected to the end of the period of extended operation.

By letter dated February 8, 2005, the applicant provided additional information to address Open Item 4.7.4-1 for Millstone Unit 3. The applicant stated that for Millstone Unit 3, the reactor coolant system loop piping (hot leg, cold leg and crossover piping) has been evaluated for LBB. The materials evaluated for these components include carbon and low alloy steels, stainless steel (including CASS), and nickel-based alloys.

CASS used in the RCS are subject to thermal aging during service. Thermal aging causes an elevation in the yield strength of the material and a decrease in the fracture toughness. The decrease in fracture toughness is proportional to the level of ferrite in the material. Thermal aging in these stainless steels will continue until a saturation or fully aged point is reached. The applicant needed to address how fatigue will be evaluated or monitored to assure that the number of cycle counts for a transient set do not exceed its cycle limits which could invalidate the fatigue crack growth analysis. By letter dated February 8, 2005, the applicant provided information to address the LBB analyses for Millstone Unit 3. The applicant stated that each of the LBB analyses associated with these systems and components were evaluated for the period of extended operation. The discussion for the reactor coolant loop piping is intended to envelop all of the current design-basis LBB analyses. The materials evaluated for the subject components include carbon and low alloy steels, stainless steel (including cast austenitic stainless steel (CASS)) and nickel-based alloys. For each LBB analysis, the inputs to the evaluation were reviewed to identify time-limited assumptions. Thermal aging of CASS materials and fatigue crack growth calculations were determined to be time-based inputs as defined in 10 CFR 54.3 and required evaluation for the period of extended operation. The TLAA evaluations of metal fatigue are discussed in LRA Section 4.3.1 and the staff's evaluation is provided in Section 4.3 of this report. The metal fatigue TLAA evaluations conclude that design-basis limits are not exceeded for ASME Class 1 components (which envelops the components evaluated for LBB) through the period of extended operation. Thermal aging of CASS materials for components that have been evaluated for LBB has been evaluated for its effect on fracture toughness. The applicant's review concluded that the analysis used fully aged values for fracture toughness. Corrosion of nickel-based alloys was also considered. Cracking due to PWSCC of nickel-based alloys is managed by the inservice inspection program: systems, components, and supports AMP described in LRA Section B2.1.18. Millstone Unit 3 has committed to follow the industry recommendations related to nickel-based alloys. This commitment is identified in Appendix A, Table A6.0-1, License Renewal commitments, Item 15. The staff finds that the applicant has provided an adequate demonstration that the TLAA for LBB evaluations for the subject components remain valid or have been projected to the end of the period of extended operation.

Based on the discussion above, the staff concludes that Open Item 4.7.4.1 is closed.

1.6 Summary of Confirmatory Items

As a result of its review of the LRA for MPS Units 2 and 3, including additional information and clarifications submitted to the NRC through February 15, 2005, the staff identified the following confirmatory items. An issue was considered confirmatory if the staff and the applicant had reached a satisfactory resolution, but the resolution had not yet been formally submitted to the staff. Each confirmatory item (CI) had been assigned a unique identifying number. By letters dated April 1, 2005, June 2, 2005, July 14, 2005, and July 21, 2005, the applicant responded to these confirmatory items. The staff reviewed these responses and has closed out each of the confirmatory items. The basis for closing the confirmatory items is as follows:

CI-3.0.3.2.18-1

The staff found that the resolution of Open Items 3.0.3.2.18-1 and 3.0.3.2.18-2 may warrant a modification to the FSAR. This issue was identified as Confirmatory Item 3.0.3.2.18-1. By letter dated July 14, 2005, the applicant provided the revised FSAR sections to reflect resolution of Open Items related to the bolting integrity program. Based on these FSAR changes, Confirmatory Item 3.0.3.2.18-1 is closed.

CI-3.1.3-3 (Section 3.1B.2.2.7 - Crack Initiation and Growth Due to Stress Corrosion Cracking (SCC) or Primary Water Stress Corrosion Cracking (PWSCC))

In response to supplemental RAI 3.1.3-3, in a letter dated February 8, 2005, the applicant stated that the response to supplemental RAI 4.7.3-1(a) addresses supplemental RAI 3.1.3-3. The staff noted that the response to RAI 4.7.3-1(a) provides information on the evaluation of CASS reactor coolant pumps and not the CASS spray head assembly requested in supplemental RAI 3.1.3-3. Therefore, the applicant was requested to provide the information requested by supplemental RAI 3.1.3-3. This was identified as Confirmatory Item 3.1.3-3.

In a supplemental response to RAI 3.1.3-3, dated June 2, 2005, the applicant agreed that the guidance contained in the staff's letter to NEI, dated May 19, 2000, should be used when analyzing the pressurizer spray head through the extended period of operation. The applicant therefore initiated an evaluation of the Millstone, Unit 3 pressurizer spray head to determine the crack growth over the period of extended operation in accordance with NUREG-1801, Section XI.M12 "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," Item 6 (Acceptance Criteria) and the flaw evaluation section of the staff's letter to NEI, dated May 19, 2000. As stated in NUREG-1801, Section XI.M12, the flaw tolerance evaluation for CASS components with ferrite values up to 25 percent is performed according to the methodology associated with the ASME Code Subsection IWB-3640 procedure for submerged arc welds. The applicant, however, could not positively confirm that the ferrite content of the Millstone, Unit 3 pressurizer spray head was less than 25 percent based on the currently available data. Since the ferrite content could not be confirmed to be less than the 25 percent used in the ASME Code methodology, the applicant could not utilize the flaw tolerance evaluation to resolve this issue and decided to manage thermal aging embrittlement of the Millstone, Unit 3 pressurizer spray head by enhanced volumetric inspections performed under the inservice inspection program: systems, components and supports aging management program, in accordance with 10 CFR 54.21(a)(1)(iii). The applicant also stated that this program is consistent with NUREG-1801, Section XI.M12, which considers an enhanced volumetric inspection (ultrasonic examination) that meets the criteria of the ASME Code, Section XI, Appendix VIII, "Performance Demonstrations for Ultrasonic Examination Systems," acceptable. This commitment is contained in the Millstone, Unit 3 LRA, Appendix A, Section A6.0, Table A6.0-1 "License Renewal Commitments," Item 28, and states that either an enhanced volumetric examination or a component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801, Section XI.M12. The staff finds the applicant's management of thermal aging embrittlement through inspection in accordance with 10 CFR 54.21(c)(1)(iii) acceptable. The staff also finds that if the applicant can confirm the ferrite content in the future, a flaw tolerance evaluation in accordance with the guidelines of NUREG-1801, Section XI.M12 is an acceptable alternative to the volumetric examination in accordance with NUREG-1801. This evaluation would have to be submitted to the NRC for approval at least two years prior to the period of extended operation. This resolves Confirmatory Item 3.1.3-3.

<u>CI-3.6-1</u> (Section 3.6.2.3 - AMR Results That Are Not Consistent With or Are Not Addressed In the GALL Report)

In its letter dated November 9, 2004, the applicant confirmed that it treats splices as an integral part of the cable and that non-EQ splices are included in commodity groups, "Conductors," and, "Insulation," in LRA Table 2.5.1-1. The associated aging management review results are included in Table 3.6.2-1. This commodity includes non-EQ cables installed in raw water or damp soil. The staff requested clarification of the statement in the LRA that the external environment would remain below 95 °F and therefore would not require an AMP. The applicant needed to provide clarification regarding the effects of ohmic heating on the cable insulation. This was identified as Confirmatory Item 3.6-1.

In response to Confirmatory Item 3.6-1, in a letter dated April 1, 2005, the applicant stated that the information requested in this confirmatory item, related to the effects of ohmic heating on the cable insulation, was provided in response to RAI 3.6-3 by letter dated January 11, 2005. In its response dated January 11, 2005, the applicant confirmed that the referenced temperature was the ambient temperature and when the effects of ohmic heating on the cable insulation is included, sufficient margin exists below the 60 year analyzed temperature limit for the extended period of operation. Therefore no aging management program is required. Based on the above, Confirmatory Item 3.6-1 is closed.

CI-4.3-1 (Section 4.3 - Metal Fatigue)

The staff noted that the applicant provided usage factors for the low-alloy charging and safety injection nozzles, whereas NUREG/CR-6260 indicates the highest environmental usage factors for the newer vintage Combustion Engineering plant occurred in the nozzle safe-ends. In a December 3, 2004, response, the applicant indicated that the highest design cumulative usage factor (CUF) for the safety injection and charging nozzles occurred in the low-alloy nozzles. However, the applicant also indicated that, using worst case environmental factors for stainless steel, the calculated CUF for the charging nozzle safe-end is greater than the low-alloy nozzle. The applicant indicated that the environmental usage factor for the safe-end is less than 1.0 using the projected number of cycles for 60 years of plant operation. Since the applicant used projected cycles instead of design cycles to evaluate the charging nozzle safe-end, the applicant's fatigue monitoring program (FMP) should incorporate these cycles in the program. This was identified as Confirmatory Item 4.3-1.

In response to Confirmatory Item 4.3-1, in a letter dated April 1, 2005, the applicant stated that cycle counting has been incorporated in the Millstone FMP and the projected cycles versus design cycles are now used in the evaluation of the charging nozzle safe-ends, with acceptable results through the period of extended operation. Based on this response, Confirmatory Item 4.3-1 is closed.

CI-4.7.4-1

Section A3.5.3 of Appendix A to the LRA provides the applicant's FSAR supplement regarding LBB for RCS piping. The FSAR supplement states, "The acceptability of eliminating Reactor Coolant System pipe LBB considerations for Millstone Unit 3 is contained within Westinghouse Topical Report WCAP-10587. The report has been re-evaluated and to be applicable for the period of extended operation." This paragraph was not clear on how the report was re-evaluated and why it is acceptable for the period of extended operation. In addition, the statement was not clear on what considerations are acceptable to be eliminated. The applicant needed to include in the summary how the report was re-evaluated and why it is applicable for the period of extended operation. The applicant also needed to address how thermal aging of CASS is supported in WCAP-10587 for the period of extended operation and how the fatigue-crack growth analysis is acceptable for the period of extended operation. On the basis of its review of the FSAR supplements, the staff concluded that the summary description of the applicant's TLAA evaluation to address LBB for the RCS piping for the period of extended operation required additional clarification to satisfy 10 CFR 54.21(d). This was identified as Confirmatory Item 4.7.4-1.

By letter dated April 1, 2005, the applicant provided the requested update to Section A3.5.3 of Appendix A to provide a summary description of the evaluation of the TLAA for LBB. The staff reviewed the revised summary description and finds that the revised summary description of the applicant's TLAA evaluation to address LBB for the period of extended operation is now adequate and satisfies 10 CFR 54.21(d). Based on the above, Confirmatory Item 4.7.4-1 is closed.

CI-B2.1.18-3 (Section B2.1.18c - Nickel Alloy Nozzles and Penetrations (XI.M11 of NUREG-1801))

The applicant stated that Millstone Unit 2 will follow industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities, and it will implement the appropriate recommendations resulting from this guidance. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 14.

In RAI B2.1.18-1, the staff requested that the applicant modify its commitment to state that the aging management activities to monitor the aging effects of nickel-based alloys will be submitted three years prior to the period of extended operation in order for the staff review and approval to determine whether the program demonstrates the ability to manage the effects of aging in nickel-based components pursuant to 10 CFR 54.21(a)(3). In addition, the applicant was requested to address how nickel-based components will be evaluated in terms of susceptibility to PWSCC.

The applicant, by letter dated December 3, 2004, modified its commitment to submit its program prior to the period of extended operation for staff review and approval. The applicant's response did not meet with the staff's request to submit the program three years prior to the period of extended operation to allow the staff time to review and approve the program. This was identified as Confirmatory Item B2.1.18-3.

In response to Confirmatory Item B2.1.18-3, in a letter dated April 1, 2005, the applicant stated that in LRA Appendix A "FSAR Supplement," Sections A2.1.18 and A2.1.22 for Unit 2 and Sections A2.1.27 and A2.1.21 for Unit 3, the commitment to follow industry efforts regarding nickel-based alloys has been modified to read:

> The revised program description will be submitted at least two years prior to the period of extended operation for staff review and approval to determine if the program demonstrates the ability to manage the effects of aging in nickel-based components per 10 CFR 54.21(a)(3).

Additionally, the schedule for Table A6.0-1, Commitment 14 (Unit 2) and 15 (Unit 3), in LRA Appendix A will be changed to:

> At Least Two Years Prior to the Period of Extended Operation.

Based on this revised commitment, Confirmatory Item B2.1.18-3 is closed.

1.7 Summary of Proposed License Conditions

As a result of the staff's review of the LRAs for MPS Units 2 and 3, including subsequent information and clarifications provided by the applicant, the staff identified three proposed license conditions.

The first license condition requires the applicant to include the FSAR supplement required by 10 CFR 54.21(d) in the next FSAR update, as required by 10 CFR 50.71(e), following the issuance of the renewed licenses.

The second license condition requires that the activities identified in Appendix A to this SER be completed in accordance with the schedule in Appendix A.

The third license condition is as follows:

All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

SECTION 2

STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

2.1 Scoping and Screening Methodology

2.1.1 Introduction

Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54 or the Rule), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," Section 54.21, "Contents of Application — Technical Information," requires that each application for license renewal contain an integrated plant assessment (IPA). Furthermore, the IPA must list and identify those structures and components (SCs) that are subject to an aging management review (AMR) from the systems, structures, and components (SSCs) that are within the scope of license renewal in accordance with 10 CFR 54.4. Sections 2.1.4 and 2.1.5 of the license renewal application (LRA) describe the applicant's process for identifying these SCs and provide the scoping and screening results for those components, subcomponents, structural members, and commodity groups that are subject to an AMR per Section 3.0 of the LRA.

In LRA Section 2.1, "Scoping and Screening Methodology," the applicant described the scoping and screening methodology used to identify SSCs at the Millstone Power Station (MPS) Units 2 and 3 within the scope of license renewal, and SCs that are subject to an AMR. The staff reviewed the applicant's scoping and screening methodology to determine if it meets the scoping requirements stated in 10 CFR 54.4(a) and the screening requirements stated in 10 CFR 54.21.

In developing the scoping and screening methodology, the applicant considered the requirements of the Rule, the Statements of Consideration (SOC) for the Rule, and the guidance presented by the Nuclear Energy Institute (NEI), "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 3, March 2001, (NEI 95-10). In addition, the applicant also considered the NRC staff's correspondence with other applicants and with NEI in the development of this methodology. Scoping and screening were performed as an integrated review at the system/structure level. Screening was performed on a component-level basis, and the scoping results were reviewed and revised as required to be consistent with the screening results. The short-lived passive components that could be excluded from an AMR on the basis of a qualified life or a specified replacement time period, were identified and screened out as part of the AMR process.

2.1.2 Summary of Technical Information in the Application

In Sections 2.0 and 3.0 of the LRA, the applicant provided the technical information required by 10 CFR 54.21(a). In LRA Section 2.1, "Scoping and Screening Methodology," the applicant describes the process used to identify the SSCs that meet the license renewal scoping criteria under 10 CFR 54.4(a), as well as the process used to identify the SCs that are subject to an AMR as required by 10 CFR 54.21(a)(1). Section 2.1.2 discusses the application of the 10 CFR 54.4(a) scoping criteria; Section 2.1.3 provides a discussion of the documentation that was used to perform scoping and screening; and Sections 2.1.4 and 2.1.5 describe the scoping and screening methodology.

Additionally, LRA Section 2.2, "Plant Level Scoping Results;" Section 2.3, "System Scoping and Screening Results: Mechanical Systems;" Section 2.4, "Scoping and Screening Results: Structures;" and Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Control Systems;" amplify the process the applicant used to identify the SCs that are subject to an AMR. LRA Section 3, "Aging Management Review Results," contains the following information:

- Section 3.1, "Aging Management of Reactor Vessel, Internals, and Reactor Coolant System"
- Section 3.2, "Aging Management of Engineered Safety Features Systems"
- Section 3.3, "Aging Management of Auxiliary Systems"
- Section 3.4, "Aging Management of Steam and Power Conversion Systems"
- Section 3.5, "Aging Management of Containment, Structures and Component Supports"
- Section 3.6, "Aging Management of Electrical and Instrumentation and Controls"

LRA Section 4, "Time-Limited Aging Analyses," contains the applicant's identification and evaluation of time-limited aging analyses (TLAA).

2.1.2.1 Scoping Methodology

In Section 2.1 of the LRA, the applicant described the methodology used to scope systems and structures pursuant to the requirements of 10 CFR 54.4(a). The applicant's scoping methodology, as described in the LRA, is outlined in the sections below.

2.1.2.1.1 Application of the Scoping Criteria in 10 CFR 54.4(a)

The applicant described the general approach to scoping safety-related (SR), non-safety-related (NSR), and SSCs credited with demonstrating compliance with certain regulated events in Section 2.1.2, "Application of the Scoping Criteria in 10 CFR 54.4(a)," of the LRA. The scoping approaches specific to each of the three scoping criteria are described as follows:

(1) <u>Application of the Scoping Criteria in 10 CFR 54.4(a)(1)</u>. In LRA Section 2.1.2.1, "10 CFR 54.4(a)(1)," the applicant discussed the scoping methodology as it related to SR criteria in accordance with 10 CFR 54.4(a)(1). With respect to the SR criteria, the applicant stated that the SSCs within the scope of license renewal include SR SSCs that are relied upon to remain functional during and following design-basis events as defined

in 10 CFR 50.49(b)(1). The quality classifications established in the Production Maintenance Management System (PMMS) for uniquely numbered plant components are consistent with the SR definitions presented in 10 CFR 50.49(b)(1) and are based on reviews of plant accident analyses and evaluations. PMMS, a multi-faceted program encompassing, in part, an equipment information database and the plant work order subsystem, also provides for the identification of relevant engineering and quality classification information and specific component information. The applicant used these quality classifications for the identification of components meeting the requirements of 10 CFR 54.4(a)(1). License renewal information is also contained in the License Renewal Information Management System (LRIMS), which is used to collect, process, and report license renewal information.

The quality classification information includes the identification of quality assurance (QA) Category 1 for SR and NSR components. For components identified as QA Category I, a safety function and safety function description are provided. In addition to identifying SR components, the following four augmented QA classifications are identified as a subset of NSR: (1) rad waste, (2) fire protection, (3) anticipated transient without scram, and (4) station blackout. The PMMS database also indicated the applicability of 16 engineering programs. Examples of engineering programs that pertain to license renewal intended functions are the electrical equipment qualification, Appendix R, seismic, fire protection, high-energy line break, heavy loads, and station blackout programs. The use of PMMS during the scoping and screening process is discussed in Sections 2.1.4 and 2.1.5 of the LRA. The classification and identification of plant components within PMMS are discussed in Section 2.1.3.4 of the LRA.

(2) Application of the Scoping Criteria in 10 CFR 54.4(a)(2). In LRA Sections 2.1.2.2, “10 CFR 54.4(a)(2) — Non Safety-Related Affecting Safety-Related;” 2.1.5, “Screening Methodology;” 2.1.3.6, “10 CFR 54.4(a)(2) Report;” and 2.1.6.9, “Scoping Criteria 10 CFR 54.4(a)(2),” the applicant discussed the scoping methodology as it related to the NSR criteria in accordance with 10 CFR 54.4(a)(2). The applicant stated that a review has been performed to identify the NSR SSCs whose failure could prevent satisfactory accomplishment of the SR intended functions identified in 10 CFR 54.4(a)(1). The NSR SSCs that are within the scope of license renewal for Units 2 and 3 fall into two categories: (1) NSR SSCs that functionally support the operation of SR SSCs and (2) NSR SSCs whose failure could cause an interaction with SR SSCs that could potentially result in the failure of the SR SSCs to perform their intended safety functions. With respect to scoping of SSCs pursuant to 10 CFR 54.4(a)(2), the applicant performed a review of the FSAR, plant-specific operating experience, and CLB documentation to provide the guidelines and the sources of information to be used as input to scoping and screening. This information was also augmented by plant walkdowns performed to identify NSR components containing liquids or steam that are spatially oriented such that their failure could prevent the satisfactory accomplishment of an SR function of an SR SSC.

The applicant’s review encompassed the design-basis earthquake (DBE) considered within these documents. The NSR SSCs already included within the scope of license renewal for 10 CFR 54.4(a)(3) were not identified for inclusion under 10 CFR 54.4(a)(2).

The NSR piping that is attached to SR piping, and that is required to be seismically designed and supported up to the first equivalent anchor point beyond the SR/NSR boundary, is included within the scope of license renewal. Although these NSR piping segments are not uniquely identified during the screening process nor highlighted on license renewal drawings, applicable aging effects for these piping segments are managed by the applicant along with the adjoining SR piping. Supports for NSR SSCs that could adversely interact with SR SSCs as a result of a seismic event (Seismic II/I) were not individually identified during the screening process. These supports were identified on a commodity basis within areas that contain SR SSCs and were included within the scope of license renewal regardless of whether they were directly associated with the SR SSCs. The results of the applicant's review were incorporated into a 10 CFR 54.4(a)(2) report, which was used as input to the scoping and screening process and is discussed in Section 2.1.3.6 of the LRA.

(3) Application of the Scoping Criteria in 10 CFR 54.4(a)(3). In LRA Sections 2.1.2.3, "10 CFR 54.4(a)(3) — Regulated Events;" 2.1.6.2, "Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout Rule for License Renewal (ISG-02);" 2.1.6.4, "Fire Protection System Piping (ISG-04);" and 2.1.6.7, "Scoping of Fire Protection Equipment for License Renewal (ISG-07);" the applicant discussed the scoping methodology as it related to the regulated event criteria in accordance with 10 CFR 54.4(a)(3). With respect to the scoping criteria set forth in 10 CFR 54.4(a)(3), the applicant evaluated all regulated events including fire protection, environmental qualification, pressurized thermal shock, anticipated transient without scram, and station blackout. For each event, the applicant identified the plant-specific licensing basis documents applicable to each regulated event, such as the final safety analysis report, safety evaluation reports (SERs), licensing correspondence, plant-controlled databases, calculations, and analyses to establish the scoping determinations. SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the applicable regulations were initially included within the scope of license renewal.

2.1.2.1.2 Documentation Sources Used for Scoping and Screening

In LRA Section 2.1.3, "Documentation Sources Used for Scoping and Screening," the applicant stated information derived from the following sources was reviewed during the license renewal scoping and screening process:

- final safety analysis report
- current licensing basis. Information including technical specifications (TS) and docketed licensing correspondence
- System Functional Requirements Manual (SFRM)
- technical position papers and reports prepared to support scoping evaluations of 10 CFR 54.4(a)(2) and the regulated events identified in 10 CFR 54.4(a)(3)
- Maintenance Rule summary reports and scoping tables
- design-basis summaries (DBSs)
- plant drawings and walkdowns
- PMMS, LRIMS, and the probabilistic risk assessment (PRA) model

The applicant stated that this information was used to identify the functions performed by plant systems and structures. These functions were then compared to the scoping criteria in 10 CFR 54.4(a)(1)-(3) to determine if the associated plant system or structure performed a license renewal intended function. These sources were also used to develop the list of structures and components subject to an AMR.

2.1.2.1.3 Plant and System-Level Scoping

In LRA Section 2.1.4, "Scoping Methodology," the applicant described the scoping methodology for plant systems and structures that were safety-related, non safety-related, and equipment relied upon to perform a function for the any of the five regulated events described in 10 CFR 54.4(a)(3).

The scoping for systems and structures was performed as two separate efforts. For system scoping, systems presumed to be within the scope of license renewal were based on the following criteria: any system containing a component whose safety classification in PMMS met one of the scoping criteria; a system function taken from the Maintenance Rule documentation; a DBS or SFRM with a license renewal intended function as defined by 10 CFR 54.4; system functions meeting the criteria of 10 CFR 54.4(a)(2) or (3); and systems which performed one or more intended functions. The preliminary scoping results were used as input to the screening process. The results of the completed screening process were used as input for reviewing and updating the system scoping results. The final system scoping results are presented in Section 2.2 of the LRA.

For structures, a structure was initially identified as being within the scope of license renewal if one or more of the criteria of 10 CFR 54.4(a) were met as identified in the FSAR (such as Class I structure designation), the 10 CFR 54.4(a)(2) report (LRA Section 2.1.3.6), or the 10 CFR 54.4(a)(3) regulated event reports (LRA Section 2.1.3.7). In some cases, MPS Unit 1 structures were included in scope for Units 2 and 3 since they provide an intended function. After the screening process for mechanical and electrical systems was completed, the lists of in-scope structures was reviewed and validated to ensure that all structures supporting in-scope systems or components were identified and included in scope. The final scoping results for structures are presented in Section 2.2 of the LRA.

2.1.2.2 Screening Methodology

Following the determination of plant systems and structures that were candidates for inclusion within the scope of license renewal, the applicant implemented a process for determining which passive components, structural members, and commodities that support a license renewal intended function would then be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1). This process is described in LRA Section 2.1.5, "Screening Methodology." The screening portion of the integrated license renewal plant assessment was divided by engineering discipline into three primary areas: system (mechanical), civil/structural, and electrical/instrumentation and controls (I&C).

The applicant also screened selected major components to identify the passive long-lived subcomponents that require an AMR, as discussed in Section 2.1.5.2 and Appendix C, Section C2.2, "Identification of In-scope Passive Subcomponents," of the LRA. Screening identified NSR SSCs that provide a support function (such as supplying instrument air, cooling water, or heating and ventilation) required for in-scope SSCs to perform their intended functions. The NSR support SSCs were included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) to a level necessary to provide satisfactory accomplishment of the SR functions identified in 10 CFR 54.4(a)(1).

2.1.2.2.1 System (Mechanical) Screening

Following system-level scoping for mechanical systems, the applicant performed screening to identify those mechanical components (pumps, valves, piping, etc.) that support the system intended functions. The intended functions, developed utilizing the documentation sources discussed previously in Section 2.1.2.1.2 of this report, were used as input to the screening process to identify the passive components within the scope of license renewal. Passive component determinations were made in accordance with 10 CFR 54.21(a)(1)(i) and the guidance in NEI 95-10, Revision 3. The license renewal boundaries for a mechanical system flow path were typically extended to include the first normally closed valve (manual valve, check valve, or automatic valve that receives a signal to close) that forms the flow path pressure boundary.

Following completion of the screening review for a system, the annotated drawings were used to generate a set of license renewal drawings which identified the in-scope passive mechanical components. This included the passive components that were subsequently determined, during the AMR process, to be short lived, as discussed in Appendix C, Section C2.3 of the LRA. The system screening results are presented in LRA Section 2.3, “Scoping and Screening Results: Mechanical Systems,” for each mechanical system containing in-scope mechanical components. The information includes the system description, FSAR references, license renewal drawings, and the components subject to an AMR. A screening summary table lists the component groups that require an AMR along with the associated intended functions. The screening section also includes a reference to the AMR results table. Screening for major components within the reactor coolant system (i.e., the reactor vessel, reactor vessel internals, and steam generators) was performed separately from the remainder of the reactor coolant system (RCS) components. Detailed screening was performed to identify subcomponents that perform or support intended functions. The results of the major components screening are presented in Section 2.3.1.1, Section 2.3.1.2, and Section 2.3.1.4 of the LRA.

2.1.2.2.2 Structural Screening

Screening was performed for each in-scope structure identified during the scoping process. Structure screening identified the passive structural members (walls, beams, floors, grating, block walls, missile shields, pads, liners, etc.) that support the intended functions of the structure and, therefore, require an AMR. The structural members that require an AMR were identified based on a review of the structural detail drawings. The screening process for nuclear steam supply system equipment supports was similar to the process for structural screening. The structural members of the support that require an AMR were identified based on a review of detailed support drawings. Load-handling cranes and devices were evaluated based on a review of the FSAR and the data in PMMS. Load-handling cranes and devices that were seismically designed are within the scope of license renewal. Structural supports were evaluated as a commodity grouping termed “general structural supports.” Other miscellaneous items such as cable tray covers, barrier doors, penetration fire seals, cabinets, and panels were evaluated as a commodity grouping termed “miscellaneous structural commodities.” The screening results are presented in LRA Section 2.4, “Scoping and Screening Results: Structures.”

2.1.2.2.3 Electrical/I&C Components Screening

The majority of electrical/I&C components (such as transmitters, switches, breakers, relays, actuators, radiation monitors, recorders, isolators, signal conditioners, meters, batteries, analyzers, chargers, motors, regulators, transformers, and fuses) are active components, in accordance with 10 CFR 54.21(a)(1)(i) and the supplemental guidelines in NEI 95-10 and, therefore, do not require an AMR. The electrical/I&C components that are in scope only because they perform a passive pressure boundary function were treated as mechanical components and identified during the mechanical system screening process. An AMR evaluation is required for component groups such as cables and connectors, electrical penetrations, and bus ducts since they perform a passive function. The electrical screening results are presented in LRA Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Controls Systems."

2.1.2.2.4 Stored Equipment Screening

In response to a February 11, 1999, letter from Christopher I. Grimes, Nuclear Regulatory Commission (NRC), to Doug Walters, NEI, "Request for Additional Information Regarding Generic License Renewal Issue No. 98-0102, 'Screening of Equipment that is Kept in Storage,'" a review was performed by the applicant to identify equipment that is maintained in storage, reserved for installation in the plant in response to a design-basis accident or regulated event, and requires an AMR. The equipment in storage that performs an intended function and is subject to an AMR includes hardware that is dedicated to the following intended functions:

- mitigates the effects of a fire
- protects against flooding of a service water pump motor
- provides temporary local valve operation in an abnormal operating event
- protects against flooding of the fire pump houses
- protects against flooding of the turbine building and intake structure

In addition to passive components, the review has also considered stored, active components that are not routinely inspected, tested, and maintained.

2.1.3 Staff Evaluation

The staff evaluated the LRA scoping and screening methodology in accordance with the guidance contained in Section 2.1, "Scoping and Screening Methodology," of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." The acceptance criteria for the scoping and screening methodology review is based on the following regulations:

- 10 CFR 54.4(a), as it relates to the identification of plant SSCs within the scope of the Rule
- 10 CFR 54.4(b), as it relates to the identification of the intended functions of plant SSCs determined to be within the scope of the Rule
- 10 CFR 54.21(a)(1) and (2), as they relate to the methods used by the applicant to identify plant SCs subject to an AMR

As part of the review of the applicant's scoping and screening methodology, the NRC staff reviewed the activities described in the following sections of the LRA using the guidance contained in NUREG-1800:

- Section 2.1, "Scoping and Screening Methodology," to ensure that the applicant described a process for identifying SSCs that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(1) - (3)
- Section 2.2, "Plant Level Scoping Results;" Section 2.3, "System Scoping and Screening Results: Mechanical Systems;" Section 2.4, "Scoping and Screening Results: Structures;" and Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Control Systems;" to assure the applicant identified the civil/structural, mechanical, and electrical/I&C components that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1) and (2).

In addition, the staff conducted a scoping and screening methodology audit at the MPS in Waterford, CT, from May 3 - 7, 2004. The focus of the audit was to ensure that the applicant had developed and implemented adequate guidance to conduct the scoping and screening of SSCs in accordance with the methodologies described in the application and the requirements of the Rule. The staff reviewed implementation procedures and engineering reports which describe the scoping and screening methodology implemented by the applicant. In addition, the staff conducted detailed discussions with the applicant on the implementation and control of the license renewal program and reviewed administrative control documentation and selected design documentation used by the applicant during the scoping and screening process. The staff further reviewed a sample of system scoping and screening results reports for the chemical and volume control system (CVCS) to ensure the methodology outlined in the administrative controls was appropriately implemented and the results were consistent with the CLB.

2.1.3.1 Scoping Methodology

The staff reviewed MPS implementation procedures, technical bases documents and reports, engineering reports, and project guidelines (GDLs) which describe the scoping and screening methodology implemented by the applicant. The applicable guidelines included GDLs 101, "Personnel Qualification and Training;" 201, "System and Structure Screening;" 401, "Discrepancy Management;" 501, "Quality Assurance Requirements and Document Control;" and 601, "LRIMS Users Guide." The staff found that the scoping and screening methodology instructions were consistent with Section 2.1 of the LRA and were of sufficient detail to provide the applicant's staff with concise guidance on the scoping and screening implementation process to be followed during the LRA activities. In addition to the implementing procedures, the staff reviewed supplemental design information including system functional descriptions, system drawings, and selected licensing documentation, which were relied upon by the applicant during the scoping and screening phases of the review. The staff found these design documentation sources to be useful for ensuring that the initial scope of SSCs identified by the applicant was consistent with the CLB of Units 2 and 3.

2.1.3.1.1 Application of the Scoping Criteria in 10 CFR 54.4(a)

Application of the Scoping Criteria in 10 CFR 54.4(a)(1). Pursuant to 10 CFR 54.4(a)(1), the applicant must consider all SR SSCs which are relied upon to remain functional during and following DBE to ensure the following functions: (i) the integrity of the reactor coolant pressure boundary; (ii) the ability to shut down the reactor and maintain it in a safe shutdown condition; or (iii) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR Part 100.11 of the *Code of Federal Regulations*, to be within the scope of license renewal. The staff found that the applicant appropriately incorporated the pertinent SR SSCs into the scope of its license renewal program. The applicant relied on PMMS as a starting point for identifying systems within the scope of the Rule. Other document sources included LRIMS, the FSAR, technical specifications, documents related to scoping for implementation of 10 CFR 50.65, the Maintenance Rule, and documents related to the MPS PRA model. Additional information sources included docketed licensing correspondence and design information related to various plant systems and technical position papers.

MPS License Renewal Technical Report MP-LR-3000/4000, “System/Structure Scoping,” provides guidance for the performance of scoping for mechanical and electrical systems and for structures. The document describes the determination of intended functions for systems and structures, identifies in-scope systems and structures based on the functions, and documents the results in the scoping report. The determination of intended functions for systems is based on the design and licensing basis documentation, license renewal technical reports for 10 CFR 54.4(a)(2) and (3) intended functions, and PMMS indicators used as input for intended function determinations.

Structure intended functions were based on the same criteria established for systems. In addition, structures that provide support or shelter for in-scope SSCs and perform an intended function are considered in scope for license renewal. Scoping of MPS Unit 1 systems and structures was performed to identify any systems or structures that support Unit 2 or 3 intended functions. As a result, Unit 1 fire protection system components that must remain functional to support Units 2 and 3 have been re-assigned to the appropriate unit. For structures, the Unit 1 turbine building flood wall and the control room/radwaste buildings have been included in scope. As part of the review of the applicant’s scoping methodology, the staff reviewed a sample of the PMMS database, 10 CFR 54.4(a)(1) scoping results, a sample of the scoping result reports to support these reviews, and held discussions with the applicant’s technical staff.

Conclusion. The staff reviewed a sample of the license renewal database 10 CFR 54.4(a)(1) scoping results and discussed the methodology and results with the applicant’s license renewal project personnel. The staff verified that the applicant had identified and used pertinent engineering and licensing information to determine the SSCs required to be in scope in accordance with the 10 CFR 54.4(a)(1) criteria. Therefore, on the basis of this sample review, discussions with the applicant, and review of the applicant’s scoping process, the staff determined that the applicant’s methodology for identifying systems and structures that meet the scoping criteria of 10 CFR 54.4(a)(1) was adequate.

Application of the Scoping Criteria in 10 CFR 54.4(a)(2). Pursuant to 10 CFR 54.4(a)(2), the applicant must consider all NSR SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs 10 CFR 54.4(a)(1)(i) - (iii), to be within the scope of the license renewal. By letters dated December 3, 2001, and March 15, 2002, the NRC issued a staff position to NEI which provided staff expectations for determining which SSCs meet the 10 CFR 54.4(a)(2) criterion.

The December 3, 2001, letter provided specific examples of operating experience which identified pipe failure events (summarized in NRC Information Notice (IN) 2001-09, “Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor”) and the approaches the NRC considers acceptable to determine which piping systems should be included in scope based on the 10 CFR 54.4(a)(2) criterion. The March 15, 2002, letter further described the staff’s expectations for the evaluation of non-piping SSCs to determine which additional NSR SSCs are within scope. The position states that applicants should not consider hypothetical failures, but rather should base their evaluation on the plant’s CLB, engineering judgment and analyses, and relevant operating experience. The paper further describes operating experience as all documented plant-specific and industry-wide experience that can be used to determine the plausibility of a failure. Documentation would include NRC generic communications and event reports, plant-specific condition reports, industry reports, and engineering evaluations.

The applicant’s methodology for performing 10 CFR 54.4(a)(2) scoping of NSR SSCs was documented in MPS License Renewal Technical Report MP-LR-3007/4007, “10 CFR 54.4(a)(2) Report.” The document described the current regulation and the interim staff position regarding scoping of SSCs with respect to the 10 CFR 54.4(a)(2) criterion, and the applicant’s methodology, discussions, and results regarding scoping in accordance with the Rule criteria. In keeping with the NEI draft position on NSR SSCs that could adversely affect SR SSCs, the applicant developed guidance for interpreting and applying the (a)(2) criterion including NSR components spatially oriented near SR components, seismic II/I components, NSR piping attached to SR piping, flooding, missiles, and high-energy line break.

For non-fluid-containing components, the applicant identified neither spray or leakage concerns nor any industry operating experience indicating a loss of structural integrity. Also, NSR non-fluid-containing components are not in scope for 10 CFR 54.4(a)(2) unless related to NSR attached to SR or to a seismic II/I concern for system components not located in a sheltered environment. For fluid-containing components, the applicant considered greater than 275 PSIG or greater than 200°F as high energy and used the spaces approach, which considered everything within the structure in scope for license renewal. For low energy, a spatial approach was used based on plant walkdowns by MPS staff. Air and gas systems were excluded from consideration. The applicant provided a list of systems in the 10 CFR 54.4(a)(2) report that contain NSR components spatially oriented such that failure could affect the function of SR components.

During the staff’s review of LRA Section 2.1.3.6, “10 CFR 54.4(a)(2) Report,” and the applicant’s technical report prepared to address the issue, the applicant stated that NSR piping that is attached to SR piping, and that is seismically designed and supported up to the first equivalent anchor point beyond the SR/NSR boundary, is included within the scope of license renewal. However Section 2.1.3.1.2 of NUREG-1800 states that the scoping methodology includes both the NSR piping and the associated piping anchors as being within the scope of license renewal pursuant to 10 CFR 54.4(a)(2).

In RAI 2.1-1, the staff requested additional information regarding the scoping methodology associated with the 10 CFR 54.4(a)(2) evaluation. The staff requested that the applicant define the term “first equivalent anchor point” as it relates to the evaluation of NSR piping attached to

SR piping and describe the methodology of its application. Additionally, in cases where plant equipment credited with providing support to NSR piping within the scope of license renewal may be equivalent to an associated piping anchor as described in NUREG-1800, the staff requested that the applicant provide justification for not including this plant equipment within the scope of license renewal. The staff also requested that the applicant describe the methodology and documentation sources used to perform walkdowns associated with the review of NSR fluid-containing components located near SR components (spatial interaction); and for low-energy, fluid-containing NSR components, describe the extent to which engineering judgment was used to identify NSR components that may affect SR components.

The applicant's November 9, 2004, response to the RAI stated that for the purpose of license renewal, the first equivalent anchor is defined as when the piping has been restrained in each of the three orthogonal directions. The response also recognized that, in some cases, plant equipment may be credited as providing restraint in one or more directions in the piping system seismic evaluation. Dominion stated that in these cases, the credited components are also included within the scope of license renewal. The applicant applied the following six criteria in the determination of the license renewal boundary endpoints for NSR piping attached to SR piping:

(1) The NSR piping terminates at plant equipment that is mounted to a baseplate supported by a structure or mounted to a foundation (base-mounted component). In this instance, the base-mounted component and supporting structure are included within the scope of license renewal.

(2) The NSR piping is attached to an SR piping run or component, constituting an endpoint for the purpose of this evaluation, since the attached SR piping would have been included in scope per 10 CFR 54.4(a)(1).

(3) A flexible connection in the NSR piping segment such as an expansion joint, flexible hose, or other component that effectively decouples the piping system.

(4) In the case of an NSR piping segment that has transitioned below-ground, a point where the buried NSR piping segment exits the ground.

(5) The NSR piping run transitions to small diameter branch piping, where the area moment of inertia ratio of the larger diameter piping to the smaller diameter piping is greater than or equal to 10.

(6) The end of the NSR piping run, such as a drain pipe that ends at an open floor drain.

The applicant stated that these conservative criteria provide assurance that the first equivalent anchor is included within the license renewal boundary. Dominion stated that in some cases, this bounding approach resulted in an overly conservative license renewal boundary determination. In cases where it was deemed appropriate to limit the additional scope for a specific piping system, specific piping anchors (or equivalent anchors) were identified via the review of isometric piping drawings. In a limited number of instances where isometric drawings were not available, plant walkdowns were performed to determine the location of the piping anchors (or equivalent anchors). This methodology provided for the determination of license renewal boundary endpoints that are at or beyond the location of the first equivalent anchor point for NSR piping that is attached to SR piping. Dominion stated that the associated piping supports and plant equipment, up to and including the license renewal boundary endpoints, are included within the scope of license renewal. However, the staff had concerns with the criteria's consistency with the CLB and whether the criteria established by the applicant would conservatively bound the equivalent anchor. This was identified as Open Item 2.1.3-1.

In response to Open Item 2.1.3-1, the applicant provided additional information to the staff on April 1, 2005, regarding the basis of the six bounding criteria used in the determination of the license renewal boundary endpoints for NSR piping attached to SR piping. The applicant stated that the bounding criteria provided assurance that the license renewal scoping boundary would envelop the scope of the NS piping system included in the design basis seismic analysis, consistent with the CLB, and in some cases, the bounding approach resulted in an overly conservative license renewal boundary determination. The applicant also provided the staff with a revised definition of an equivalent anchor to be used for the purposes of identifying the NS piping in the scope of license renewal during the case-by-case reviews. The revised definition was changed from one restraint in each of the three orthogonal directions to two restraints. A review was performed by the applicant to apply this equivalent anchor definition to the cases where the LR boundary endpoint was previously determined through piping analysis/isometric drawing review or plant walkdown. The applicant stated that as a result, the LR boundary was extended where necessary to include additional supports and portions of piping systems; however, there were no additional component types as a result of these boundary extensions.

Based on the above discussion, the staff concludes that the applicant has supplied sufficient information to demonstrate that SSCs, that meet the scoping requirements of 10 CFR 54.4(a)(2), have been identified as being within the scope of license renewal. Therefore, Open Item 2.1.3-1 is considered closed.

As described in LRA Section 2.1.3.6, NSR fluid-containing components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of an SR function of an SR SSC, are included within the scope of license renewal. The applicant stated that identification of these NSR components was based on knowledge-based reviews of the facility configuration and were conducted by experienced plant personnel, supplemented by facility walkdowns, as needed. NSR fluid-containing components in low-energy systems that could affect the function of SR SSCs due to their spatial orientation were determined based on the judgment of the evaluator. Considerations included collapse envelope, fluid leakage, spray, and flood potential. Dominion developed more comprehensive guidelines to limit the use of judgment in the determination of these in-scope NSR components.

Dominion’s revised spatial orientation guidelines also considered whether the fluid contents from an NSR component could flow from the area through doorways, grating, or floor penetrations, and then drip on SR components in an adjacent area. As such, credit may be taken for mitigating features such as curbing, dikes, and floor drains which are also included within scope of license renewal. These revised criteria provide comprehensive guidance for the determination of the NSR components in low-energy systems that could affect SR SSC functions due to their spatial orientation.

Dominion stated that implementation of these revised methodologies has resulted in the addition of eight Unit 2 systems. Also, the implementation of the spatial and/or NSR-attached-to-SR piping methodologies caused many systems, previously within the scope of license renewal, to have expanded license renewal boundaries. Additionally, as a result of the revised methodology regarding NSR-attached-to-SR piping, the Unit 3 groundwater underdrains storage tank and the foundation of the primary water storage tank (previously listed in LRA Table 2.2-4 as not in scope for Unit 2), were also added to the scope of license renewal.

For seismic II/I, the applicant stated that Unit 2 was designed to meet the seismic criteria stated in FSAR Section 5.8.4, while Unit 3 was designed to comply with USNRC Regulatory Guide (RG) 1.29, "Seismic Design Classification," Revision 3, dated September 1978. The applicant performed a walkdown of the components on the Unit 2 safe shutdown equipment list developed for NRC Unresolved Safety Issue A-46 in response to NRC Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors," USNRC, dated February 19, 1987. During the walkdown, potential seismic system interactions that could physically impact safe shutdown equipment were reviewed to ensure that equipment within the scope of the review was not affected by the failure or displacement of adjacent structures, piping, or equipment due to physical impact. Particular attention was given to NSR equipment affecting SR equipment. In the screening process, the applicant used a spaces approach to accommodate seismic II/I supports and a commodity approach to evaluate them.

For NSR fluid-containing components located near SR components (spatial orientation), the applicant queried the PMMS database to determine the structures that contain SR components and the fluid-containing NSR components in the structures that contain SR components. These components are relied on to maintain their limited structural integrity (LSI) and pressure boundary to ensure that the SR components in the vicinity can perform their intended function(s). The applicant used the term LSI to define sufficient structural integrity to preclude detrimental effects on SR components and applied the term to fluid-containing components that may experience loss of LSI from internal- or external-related degradation. The applicant provided a list of systems containing NSR fluid-containing components in Attachments 1 and 2 of its 10 CFR 54.4(a)(2) report.

Conclusion. As part of the review of the applicant's scoping methodology, the staff also reviewed a sample of the license renewal database scoping results to determine if the methodology adequately identified NSR SSCs meeting the 10 CFR 54.4(a)(2) scoping criteria. Based on this review, and as described above, the applicant's methodology for scoping NSR equipment adequately identified those NSR SSCs whose failures are considered in the CLB and could prevent the satisfactory accomplishment of the SR functions identified under 10 CFR 54.4(a)(1). Therefore, the staff determined that the applicant's methodology for identifying systems and structures meeting the scoping criteria of 10 CFR 54.4(a)(2) was adequate.

On the basis of the staff's review of the LRA, the staff's audit of the applicant's scoping and screening methodology, the staff's review of the applicant's response to the RAI, and the applicant's review and evaluation of relevant operating experience, the staff concludes that the applicant supplied sufficient information to demonstrate that all SSCs meeting the 10 CFR 54.4(a)(2) scoping requirements have been identified as being within the scope of license renewal.

Application of the Scoping Criteria in 10 CFR 54.4(a)(3). Pursuant to 10 CFR 54.4(a)(3), the applicant must consider all SSCs relied on in safety analyses or plant evaluations which perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63) to be within the scope of the license renewal. The applicant's methodology for performing the scoping of SSCs in accordance with 10 CFR 54.4(a)(3) was documented in MPS License Renewal Project Technical Reports MP-LR-3002/4002 through

3006/4006 developed by the applicant for each regulated event applicable to MPS Units 2 and 3. The applicant performed the initial scoping for regulated events by evaluating CLB information relevant to each regulated event to identify if the structure or system met the scoping criteria of 10 CFR 54.4(a)(3). For each event, the applicant developed a technical report which described the following: the relevant rule requirements; a functional description of the implementation of that requirement at the MPS Units 2 and 3; specific information regarding systems and components credited for the event; the process to identify the scoping boundaries associated with the systems credited; the intended functions applicable to the requirement; a list of CLB information sources used for the analysis; and a list of systems and components determined to be within scope for the given regulated event.

Station Blackout. MPS License Renewal Project Technical Report MP-LR-3006/4006, Revision 3, provided the plant design information for MPS Units 2 and 3 pertaining to the SBO system. All plant systems were reviewed to determine which SSCs were required to achieve and maintain a reactor coolant system temperature equal or below the TS limit for a hot standby condition, assuming an SBO. The technical report stated that all SSCs that performed a function that supported compliance with 10 CFR 50.63 were within the scope of license renewal.

In an April 1, 2002, letter from D. Matthews (NRC) to A. Nelson (NEI) and D. Lochbaum (Union of Concerned Scientists), the staff provided guidance on the scoping of equipment relied on to meet the requirements of the SBO rule. In this letter, the staff noted that, consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63(a)(1), the plant system portion of the offsite power system that is used to connect the plant to the offsite power source should be included within the scope of the Rule. In LRA Section 2.1.3.7.5, the applicant stated that the SBO scoping effort identified SCs of the offsite power system for each plant required to restore power from the onsite switchyard down to the SR busses in the plant. Furthermore, the applicant stated that the plant offsite power system and these SCs, which were classified as satisfying 10 CFR 54.4(a)(3), were included within the scope of license renewal. The staff determined that the applicant's approach to scoping SSCs relied on to demonstrate compliance with 10 CFR 50.63 was consistent with the staff's April 1, 2002, interim guidance.

Environmental Qualification. MPS License Renewal Project Technical Report MP-LR-3002/4002, Revision 2, provided the plant design information for MPS Units 2 and 3 pertaining to the EQ program. The EQ program had three major elements for compliance that were reviewed by the staff: design basis, design verification, and implementation. Section 2.1.3.7.2 of the LRA described how the program was developed to maintain compliance with 10 CFR 50.49. The electrical components that fell within the scope of the program were identified in the environmental qualification master list (EQML) and the PMMS. The staff reviewed a sample of components in the EQML and PMMS and determined that they were appropriately classified as within the scope of the Rule. Additionally, the staff found that components such as doors, penetrations, seals, and dampers that provide a barrier between mild and harsh areas of the plants were also included within the scope of license renewal.

Anticipated Transient Without Scram. MPS License Renewal Project Technical Report MP-LR-3003/4003, Revision 2, provided the plant design information pertaining to the ATWS systems at MPS Units 2 and 3. The staff reviewed the report which described how the requirements of 10 CFR 50.62 were fulfilled at MPS Unit 2 by the diverse scram system (DSS) and the ATWS mitigating system actuating circuitry (AMSAC). At Millstone Unit 3, the requirements of 10 CFR 50.62 were fulfilled by AMSAC as validated by the Westinghouse AMSAC generic design. The staff reviewed Section 2.1.3.7.4 of the LRA for each unit, which further discussed the AMSAC and DSS systems. The technical report concluded that all SSCs that perform a function which supports compliance with 10 CFR 50.62 were within the scope of license renewal.

Fire Protection. MPS License Renewal Project Technical Report MP-LR-3005/4005, Revision 4, provided the plant design information pertaining to the fire protection systems and fire safe shutdown systems for MPS Units 2 and 3. The staff reviewed the report that described the fire protection and fire safe shutdown equipment as it related to SSCs that are required by 10 CFR 50.48 and included within the scope of license renewal. The report also described the basis for excluding some fire-protection SSCs from the scope of license renewal. The staff also reviewed LRA Section 2.1.3.7.1 for each unit that described the review performed to identify specific SSCs that fell within the scope of license renewal for fire protection including those relied upon in the fire hazard analysis.

Pressurized Thermal Shock. MPS License Renewal Project Technical Report MP-LR-3004/4004, Revision 0, provided the plant design information pertaining to PTS for MPS Units 2 and 3. The staff reviewed the report that stated that all SSCs performing a function that supported compliance with 10 CFR 50.61 were within the scope of license renewal. The report also stated that an engineering calculation (95-SDS-1007MG) was performed to determine reactor vessel material nil-ductility transition temperature values for the 20-year renewal term and compared to the screening criteria of 10 CFR 50.61. The results indicated both units would remain compliant with the regulation screening criteria for the 20-year renewal term without any additional compensatory actions. The staff also reviewed Section 2.1.3.7.3 of the LRA, which briefly described the contents of the report noted previously in this paragraph. The evaluation of reactor pressure vessel material was further described in Section 4.2 of the LRA.

Conclusion. As part of the review of the applicant's scoping methodology, the staff reviewed a sample of the license renewal database 10 CFR 54.4(a)(3) scoping results, reviewed a sample of the analyses and documentation to support these reviews, and discussed the methodology and results with the applicant's personnel responsible for these evaluations. The staff verified that the applicant had identified and used pertinent engineering and licensing information to determine the SSCs required to be in scope in accordance with 10 CFR 54.4(a)(3). Based on this sampling review and discussions with the applicant, the staff determined that the applicant's methodology for identifying systems and structures meeting the scoping criteria of 10 CFR 54.4(a)(3) was adequate.

2.1.3.1.2 Plant System and Structure Scoping

The applicant's methodology for performing the scoping of systems and structures in accordance with 10 CFR 54.4(a) was documented in MPS License Renewal Project Technical Report MP-LR-3000/4000, Revision 7, "System/Structure Scoping Millstone Power Station." The approach used by the applicant for system and structure scoping was consistent with the methodology described in Section 2.1.4 of the LRA. Specifically, MP-LR-3000/4000 stated that personnel performing license renewal scoping use CLB documents and list all functions that the system or structure is required to accomplish. Sources of information regarding the CLB for systems and structures included the FSAR, DBS, system descriptions, PMMS database, Maintenance Rule information, plant drawings, and the SFRMs. The applicant utilized a two-step process for system/structure scoping. After the preliminary identification of potential in-scope systems/structures, the screening process then reviewed each potential in-scope system/structure in detail to confirm, supplement, or refute the preliminary determinations made during the scoping process. The applicant first identified all plant systems using PMMS, then evaluated them against the scoping criterion of 10 CFR 54.4(a)(1)-(3) to identify those systems that perform one or more intended functions.

A system or structure was presumed to be within the scope of license renewal if it performed one or more SR functions or met other scoping criteria per the Rule as determined by CLB review and walkdown by technical personnel. Identified system or structure functions were then compared to a list of scoping and screening questions to determine the functions that met the scoping criteria of 10 CFR 54.4(a). The applicant documented the results of the scoping process in accordance with MPS MP-LR-3000/4000, Attachments A through E, "MPS Unit 2/3 Database Scoping Matrix." The scoping matrix included a description of the structure or system, the 10 CFR 54.4(a) scoping criteria met by the system or structure, and references. Due to design differences between the units, separate lists identifying the in-scope structures and systems for each unit were developed. During the scoping methodology audit, the NRC staff reviewed a sampling of the applicant's scoping documentation and concluded that it contained an appropriate level of detail to document the scoping process.

Conclusion. Based on a review of the LRA, the scoping and screening implementation procedures, and a sampling review of system and structure scoping results during the methodology audit, the staff concluded that the applicant's scoping methodology for systems and structures was adequate. In particular, the staff determined that the applicant's methodology reasonably identified systems and structures within the scope of license renewal and their associated intended functions.

2.1.3.2 Screening Methodology

The staff reviewed the screening methodology used by the applicant to determine if mechanical systems, structures, and electrical/I&C components within the scope of license renewal would be subject to an AMR. The applicant described its screening process in Section 2.1.5 of the LRA. The initial scoping effort described in LRA Section 2.1.4 identified the plant systems and structures that were candidates for inclusion within the scope of license renewal. Screening was performed in accordance with the guidance provided in NEI 95-10, Revision 3, and applicable NRC interim staff guidance.

MPS License Renewal Project Guideline GDL 201, "System and Structure Screening," was used by the applicant during the screening process. The document provides guidance to determine intended functions, develop license renewal drawings and component groups, and identify passive components and structural members subject to an AMR. For each of those systems and structures, screening was performed to identify the passive components, structural members, and commodities that support an intended function and subject to further AMR. The components that are short-lived (and therefore did not require an AMR) were identified as part of the AMR process, as discussed in LRA Section C2.3, "Identification of Short-lived Components and Consumables." Screening was divided by engineering discipline into three primary areas: system (mechanical), civil/structural, and electrical/I&C. The screening results were used to validate the initial lists of systems and structures within the scope of license renewal. Scoping results were updated as necessary to reflect the screening results. The screening processes for these areas are described in LRA Sections 2.1.5.1, 2.1.5.3, and 2.1.5.4. Section 2.1.5.5 summarizes the screening review performed for stored equipment. The staff evaluated the applicant's screening methodology against the criteria contained in

10 CFR 54.21(a)(1) and (2) using the review guidance contained in NUREG-1800, Section 2.1.3.2, "Screening."

Pursuant to 10 CFR 54.21(a)(1), the applicant's integrated plant assessment (IPA) must identify and list those SCs subject to an AMR. The criterion also requires that SCs subject to an AMR shall encompass those that (i) perform an intended function, as described in 10 CFR 54.4, without moving parts or a change in configuration or properties; and (ii) are not subject to replacement based on a qualified life or specified time period. In accordance with 10 CFR 54.21(a)(2), the applicant is also required to describe and justify the methods used to comply with 10 CFR 54.21(a)(1). The staff evaluation of the applicant's screening approach for each of these disciplines is described in Sections 2.1.3.2.1, 2.1.3.2.2, and 2.1.3.2.3.

2.1.3.2.1 System (Mechanical) Screening

The staff reviewed the methodology used by the applicant to determine if mechanical systems, identified within the scope of license renewal, were screened to determine the in-scope boundary and the passive components that would be subject to further AMR. For mechanical components, a screening process was applied to each mechanical system determined to be in scope in order to determine the types of mechanical component commodities within the systems and the various materials and environments to be considered in the AMR. Evaluation boundaries were established for the various plant mechanical systems, as discussed previously in Section 2.1.2.2.1, in order to further identify individual mechanical components for review. Information sources included design and licensing basis documents, plant drawings, technical reports, and discussions with licensed senior reactor operators and system engineers. The listing of mechanical components was facilitated by grouping these items into component groups from a review of specific in-scope passive equipment. Component-level functions were determined on a component-group basis. Screening reports were developed to document the results of the screening process. License renewal boundary drawings were developed to show the in-scope, passive equipment. These groups were placed into the license renewal database and evaluated in accordance with the screening criteria described in GDL 201. The applicant provided the staff with a detailed discussion of the process and provided screening report information from the license renewal database that described the screening methodology as well as a sample of the screening results reports for a selected group of SR and NSR systems. The staff determined that the screening methodology was consistent with the requirements of the Rule and that implementation of the methodology will identify SCs that meet the screening criteria of 10 CFR 54.21(a)(1).

The staff reviewed the methodology used by the applicant to identify and list the mechanical components and commodities subject to an AMR, as well as the applicant's technical justification for this methodology, and discussed the results with the applicant's cognizant engineers and license renewal staff. The staff also examined the applicant's screening results from the implementation of this methodology by reviewing the MPS Units 2 and 3 CVCSs which were identified as being within the scope of license renewal. The system was selected because it met all three criteria of 10 CFR 54.4(a)(1)-(3). The system meets 10 CFR 54.4(a)(1) since it provides a borated water flow path to the reactor coolant system for reactivity control and for make-up water in the event of an accident; 10 CFR 54.4(a)(2) because the system contains NSR components credited for mitigating the effects of a high-energy line break, and the spatial interaction associated with 10 CFR 54.4(a)(1) components; and 10 CFR 54.4(a)(3) because it contains environmentally qualified equipment and supports FP and SBO. The staff reviewed the DBS for Unit 2 (DBS-2304) and Unit 3 (CVC-3304), evaluation boundaries referenced in license renewal drawings for the system, resultant screened-in components and commodities, the corresponding component-level intended functions, regulated event evaluations, and the resulting list of mechanical components and commodity groups subject to an AMR. The staff also reviewed CVCS Screening Report MP-LR-3111, Revision 3, which provided function descriptions and associated scoping criteria classifications. The report lists several categories including component type (if an AMR was required), and a comment section. The staff also discussed the process and results with the cognizant engineers who performed the review and also reviewed the MPS License Renewal Tagging Record, dated February 23, 2004, which listed passive mechanical components tagged as in scope for CVCS.

During the staff’s audit of the applicant’s scoping and screening methodology, the staff questioned the exclusion of the Unit 3 boric acid batch tank from within the CVCS evaluation boundary. Further review by the applicant determined that the tank in question should have been included within the evaluation boundary and, therefore, potentially subject to AMR. The staff verified, through discussion with the applicant, that an extent-of-condition review was performed to assure that no other similar commodities were excluded from evaluation boundaries, for other in-scope SSCs, and that the tank would be screened for AMR. The applicant stated that the exclusion of the tank from the AMR screening process would be resolved through the use of MPS License Renewal Project Guideline MP-LRP-GDL 401, Revision 2, “Discrepancy Management.”

Conclusion. The staff determined that the applicant’s mechanical component screening methodology was consistent with the guidance contained in NUREG-1800 and was capable of identifying those passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.2 Structural Components Screening

The staff reviewed the methodology used by the applicant to determine if structural components and commodities within the scope of license renewal would be subject to an AMR. For civil structures and component supports, a screening process was applied to buildings and civil structures determined to be in scope to determine the types of structural elements utilized and the various materials and environments to be considered in the AMR. The staff discussed the methodology and results with the applicant’s technical staff. The staff also examined the applicant’s results from the implementation of this methodology by reviewing a sample of the plant structures identified as being within the scope of license renewal. The review included the evaluation boundaries, resultant in-scope components, the corresponding component-level intended functions, and the resulting list of structural components and structural commodity groups subject to an AMR. The staff reviewed several LRIMS reports which listed a breakdown of the structural components within scope of license renewal. Each report listed several categories including component type and material. Evaluation boundaries were established for the various plant structures within the scope of license renewal.

In general, the boundary for a building or structure was the entire building, including the structural members and components that support equipment, piping, ductwork, foundations, walls, beams, and equipments slabs. The various types of structural elements, materials, and environments that make up the buildings and structures were identified and listed. The listing of structural elements was facilitated by grouping these items into commodity groups. A list of structural commodity groups and components was also developed for each civil/structural evaluation boundary. The staff reviewed GDL 201 which described the screening methodology, including the attachments which described the guidelines for identifying passive component groups requiring an AMR, and MPS License Renewal Technical Reports MP-LR-3728/4728, Revision 3, “Structures Monitoring Program,” which described the condition monitoring program used for in-scope structures.

Conclusion. The staff concluded that the screening methodology was consistent with the requirements of the Rule; that implementation of the methodology will identify civil/structural components that meet the screening criteria of 10 CFR 54.21(a)(1); that the applicant’s structural component screening methodology was consistent with the guidance contained in NUREG-1800; and that the methodology was capable of identifying those passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.3 Electrical/I&C Components Screening

The staff reviewed the methodology used by the applicant to determine if electrical/I&C components within the scope of license renewal would be subject to an AMR. As stated in the LRA, the applicant had used the guidelines of NEI 95-10, Revision 3, Appendix B, “Typical Structure, Components, and Commodity Groupings and Active/Passive Determinations for the Integrated Plant Assessment,” and applied the commodity approach to scoping and screening of electrical/I&C components. The applicant determined that the following electrical/I&C component groups perform a passive function and require an AMR: cables and connectors, electrical penetrations, and bus ducts. The screening activities were documented in the following MPS License Renewal Technical Reports: MP-LR-3655/4655, “License Renewal Project Aging Management Review Cables and Connectors;” MP-LR-3656/4656, “License Renewal Project Aging Management Review Bus Ducts;” and MP-LR-3657, “License Renewal Project Aging Management Review Electrical Penetrations.”

The staff discussed the methodology and results with the applicant and reviewed the results from the implementation of the methodology by reviewing several electrical/I&C commodity samples. The review verified that the applicant’s staff had consistently applied the screening criteria to identify those electrical/I&C commodity groups subject to an AMR. The staff also determined that the electrical screening process was consistent with 10 CFR 54.21(a)(1)(ii) and excluded those components or commodity groups that are subject to equipment qualification requirements. The staff did not identify any discrepancies between the methodology documented and the implementation results.

The staff also reviewed the applicant’s approach to scoping and screening of electrical fuse holders. In ISG-5, “Identification and Treatment of Electrical Fuse Holders for License Renewal,” dated March 10, 2003, the staff stated that consistent with the requirements specified in 10 CFR 54.4(a), fuse holders (including fuse clips and fuse blocks) are considered passive electrical components. Fuse holders would be scoped, screened, and included in the AMR in the same manner as terminal blocks and other types of electrical connections that are currently being treated in the process. This staff position only applies to fuse holders that are not part of a larger assembly, but support SR and NSR functions in which the failure of a fuse precludes a safety function from being accomplished. The applicant stated in MPS License Renewal Technical Report MP-LR-3903/4903, “Interim Staff Guidance,” that fuse holders (including metallic clamps for the fuse clips, insulation material, and fuse blocks) meeting these requirements will be evaluated before the beginning of the period of extended operation for possible aging effects requiring management. The fuse holders will either be replaced, modified to remove the aging effects, or a program will be implemented to manage the aging effects as documented in MPS License Renewal Technical Report MP-LR-3731/4731, "Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." The staff determined that this was consistent with the ISG.

Conclusion. The staff concluded that the applicant's electrical/I&C screening methodology was consistent with the requirements of the Rule; that implementation of the methodology will identify electrical/I&C components that meet the screening criteria of 10 CFR 54.21(a)(1); that the applicant's electrical/I&C components screening methodology was consistent with the guidance contained in NUREG-1800 and the staff's interim guidance, and capable of identifying passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.4 Stored Equipment Screening

In LRA Section 2.1.5.5, "Screening of Stored Equipment," the applicant stated that a review had been performed to identify equipment that is maintained in storage, reserved for installation in the plant in response to a design-basis accident or regulated event, and requires an AMR. The LRA stated that the applicant had identified certain equipment maintained in storage which supported the intended functions of systems within scope of license renewal and indicated that the identified equipment was subject to an AMR. In addition to passive components, the review has also considered stored active components that are not routinely inspected, tested, and maintained.

The staff also reviewed MPS License Renewal Technical Report MP-LR-3920/4920, License Renewal Project Position Paper, "Review of Stored Equipment Millstone Power Station," which documented the applicant's activities regarding the screening of equipment that is stored either in a warehouse or in staged locations throughout the station. The screening was applicable for equipment that is normally not in service but is in storage and reserved for use in an application where it would perform a license renewal intended function when installed. Equipment in storage included equipment stored in a warehouse, as well as equipment staged within the plant at locations designated to facilitate its timely use.

To determine if the equipment in storage required an AMR, the applicant had identified stored equipment that was reserved for installation in a specific location where it performs an intended function for a system within scope of license renewal in accordance with 10 CFR 54.4(a)(1)-(3). The intended functions were documented in Section 5 of the MPS Technical Report. Passive stored equipment and active stored equipment (if not periodically tested) were also subject to an AMR. Determination of short-lived and long-lived stored equipment was addressed in the AMR for the respective system. Stored equipment not designated for use exclusively in such locations was excluded from further consideration (e.g., crimping tools, wrenches, screwdrivers, propane cylinders/cutter, test meters, flashlights, etc.).

Conclusion. The staff determined that the applicant's approach to scoping and screening of stored equipment is consistent with 10 CFR 54.4 and will identify stored equipment that meets the screening criteria of 10 CFR 54.21(a)(1). Specifically, the staff concluded that the applicant had appropriately considered equipment maintained in storage which supported the intended functions of systems within scope of license renewal and indicated that the identified equipment was subject to an AMR. In addition to passive components, the applicant had also considered stored active components that are not routinely inspected, tested, and maintained.

2.1.4 Evaluation Findings

The staff review of the information presented in Section 2.1 of the LRA, the supporting information in the scoping and screening implementation procedures and reports, the information presented during the scoping and screening methodology audit, and the applicant's responses to the staff's RAIs, formed the basis of the staff's safety determination. The staff verified that the applicant's scoping and screening methodology was consistent with the requirements of the Rule and the staff's position on the treatment of NSR SSCs. On the basis of this review, the staff concludes that there is reasonable assurance that the applicant's methodology for identifying SSCs within the scope of license renewal and SCs requiring an AMR is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

2.2 Plant-Level Scoping Results

In license renewal application (LRA) Section 2.1, the applicant described the methodology for identifying the SSCs within the scope of license renewal. In LRA Section 2.2, the applicant used the scoping methodology to determine which of the SSCs are required or not required to be included within the scope of license renewal. The staff reviewed the plant-level scoping results to determine whether the applicant had properly identified all plant-level systems and structures relied upon to mitigate design-basis earthquakes (DBEs), as required by 10 CFR 54.4(a)(1), or whose failure could prevent satisfactory accomplishment of any of the safety-related functions, as required by 10 CFR 54.4(a)(2), as well as the systems and structures relied on in safety analysis or plant evaluations to perform a function required by one of the regulations referenced in 10 CFR 54.4(a)(3).

2.2A Unit 2 Plant-Level Scoping Results

2.2A.1 Summary of Technical Information in the Application

In LRA Tables 2.2-1 and 2.2-3, the applicant provided a list of the plant systems and structures, respectively, that are within the scope of license renewal. In LRA Tables 2.2-2 and 2.2-4, the applicant provided a list of the plant systems and structures, respectively, that are not within the scope of license renewal. Based on the design-basis events considered in the plant's CLB, other CLB information relating to NSR systems and structures, certain regulated events, the applicant identified those plant-level systems and structures within the scope of license renewal as defined in 10 CFR 54.4.

In response to RAI 2.1-1 (described in Section 2.1 of this SER), the applicant changed the methodology used for determining the NSR SSCs that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2). The applicant's response to RAI 2.1-1 and supplemental information related to implementation of the revised scoping methodology are documented in the applicant's response dated November 9, 2004. As a result of the implementation of the scoping methodology changes, the applicant added to the scope of license renewal the following, previously excluded, NSR systems:

- aerated liquid radwaste
- solid waste processing
- turbine building closed cooling water
- water box priming

- auxiliary steam reboiler and deaerating feedwater
- exciter air cooler
- stator liquid cooler
- turbine lube oil

2.2A.2 Staff Evaluation

In LRA Section 2.1, the applicant described its methodology for identifying the structures and systems that are within the scope of license renewal and subject to an AMR. The staff reviewed the scoping and screening methodology and provided its evaluation of the methodology in Section 2.1 of this SER. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results as shown in LRA Sections 2.2-1, 2.2-2, 2.2-3, and 2.2-4, and added systems due to the changed scoping methodologies to confirm that there was no omission of plant-level systems and structures within the scope of license renewal.

The staff determined whether the applicant properly identified the structures and systems within the scope of license renewal in accordance with 10 CFR 54.4. The staff reviewed selected structures and systems that the applicant did not identify as falling within the scope of license renewal to verify whether the structures and systems have any intended functions that would require their inclusion within the scope of license renewal. The staff's review of the applicant's implementation was conducted in accordance with the guidance described in Standard Review Plan for License Renewal (SRP-LR) (NUREG-1800) Section 2.2, "Plant-Level Scoping Results."

The staff sampled the contents of the FSAR based on the listing of systems and structures in LRA Sections 2.2-1, 2.2-2, 2.2-3, and 2.2-4 to determine whether there were systems or structures that may have intended functions as defined by 10 CFR 54.4, but were omitted from the scope of license renewal. The staff review did not identify any omissions.

2.2A.3 Conclusion

The staff reviewed LRA Section 2.2, the applicant's November 9, 2004, RAI response, including Attachment 1, "Request for Additional Information Responses," and the supporting information in the FSAR to determine whether any structures or systems within the scope of license renewal had not been identified by the applicant. The staff's review did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the structures and systems that are within the scope of license renewal in accordance with 10 CFR 54.4.

2.2B Unit 3 Plant-Level Scoping Results

2.2B.1 Summary of Technical Information in the Application

In LRA Table 2.2-1 and Table 2.2-3, the applicant provided a list of the plant systems and structures, respectively, that are within the scope of license renewal. In LRA Table 2.2-2 and Table 2.2-4, the applicant provided a list of the plant systems and structures, respectively, that are not within the scope of license renewal. Based on the design-basis events considered in the plant's CLB, other CLB information relating to NSR systems and structures, and certain regulated events, the applicant identified those plant-level systems and structures within the scope of license renewal, as defined in 10 CFR 54.4.

In response to RAI 2.1-1 (described in Section 2.1 of this SER), the applicant changed the methodology used for determining the NSR SSCs that are within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). The applicant's response to RAI 2.1-1 and supplemental information related to implementation of the revised scoping methodology are documented in the applicant's response dated November 9, 2004. No new systems were added due to the NSR piping interaction with the safety-related piping methodology changes.

2.2B.2 Staff Evaluation

In LRA Section 2.1, the applicant described its methodology for identifying the structures and systems that are within the scope of license renewal and subject to an AMR. The staff reviewed the scoping and screening methodology and provided its evaluation of the methodology in Section 2.1 of this SER. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results as shown in LRA Sections 2.2-1, 2.2-2, 2.2-3, and 2.2-4, and in the November 9, 2004, response to confirm that there was no omission of plant-level systems and structures within the scope of license renewal.

The staff determined whether the applicant properly identified the structures and systems within the scope of license renewal in accordance with 10 CFR 54.4. The staff reviewed selected structures and systems that the applicant did not identify as falling within the scope of license renewal to verify whether the structures and systems have any intended functions that would require their inclusion within the scope of license renewal. The staff's review of the applicant's implementation was conducted in accordance with the guidance described in SRP-LR Section 2.2."

The staff sampled the contents of the FSAR based on the listing of systems and structures in LRA Tables 2.2-1, 2.2-2, 2.2-3, and 2.2-4 to determine whether there were systems or structures that may have intended functions as defined by 10 CFR 54.4, but were not included within the scope of license renewal. The staff review did not identify any omissions.

2.2B.3 Conclusion

The staff reviewed LRA Section 2.2, the applicant's November 9, 2004, RAI response, including Attachment 1, "Request for Addition Information Responses," and the supporting information in the FSAR to determine whether any structures or systems within the scope of license renewal had not been identified by the applicant. The staff's review did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the structures and systems that are within the scope of license renewal in accordance with 10 CFR 54.4.

2.3 System Scoping and Screening Results – Mechanical Systems

This section documents the staff's review of the applicant's scoping and screening results for mechanical systems. Specifically, this section discusses the following mechanical systems:

- reactor coolant system
- engineered safety features systems
- auxiliary systems
- steam and power conversion systems

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must identify and list passive, long-lived mechanical systems and components that are within the scope of license renewal and subject to an AMR. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results. This approach allowed the staff to confirm that there were no omissions of mechanical system components that meet the scoping criteria and are subject to an AMR.

Staff Evaluation Methodology. The staff's evaluation of the information provided in the LRA was performed in the same manner for all mechanical systems. The objective of the review was to determine if the components and supporting structures for a specific mechanical system that appeared to meet the scoping criteria specified in the rule were identified by the applicant as within the scope of license renewal in accordance with 10 CFR 54.4. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Scoping. To perform its evaluation, the staff reviewed the applicable LRA section and associated component drawings, focusing its review on components that had not been identified as within the scope of renewal. The staff reviewed relevant licensing basis documents, including the FSAR, for each mechanical system component to determine if the applicant had omitted components with intended functions delineated in 10 CFR 54.4(a) from the scope of license renewal. The staff also reviewed the licensing basis documents to determine if all intended functions delineated in 10 CFR 54.4(a) were specified in the LRA. If omissions were identified, the staff requested additional information to resolve the discrepancy.

Screening. Once the staff completed its review of the scoping results, the staff evaluated the applicant's screening results. For those structures and components with intended functions, the staff sought to determine if the functions are performed with moving parts or a change in configuration or properties, or if they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). For those that did not meet either of these criteria, the staff sought to confirm that these mechanical system components were subject to an AMR as required by 10 CFR 54.21(a)(1). If discrepancies were identified, the staff requested additional information to resolve them.

The staff reviewed LRA Section 2.3 using the evaluation methodology described above in this section of the SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3, "Scoping and Screening Results — Mechanical Systems."

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3, the staff identified areas in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated June 9, 2004, the staff issued RAIs concerning the specific issues to determine whether the applicant properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following discussion describes the staff's RAIs and the applicant's related responses.

On March 3, 2004, the staff held a teleconference with the applicant to discuss RAI 2.3-1 and to clarify whether the LRA boundary drawings highlight only those components that are subject to an AMR, or all systems that are within the scope of license renewal because they meet one or more of the 10 CFR 54.4(a) criteria. The applicant stated:

> The LRA drawings are boundary drawings and show the portions of the system that perform 10 CFR 54.4 intended functions. Components that are not subject to AMR because they are short-lived or active have been screened out and are not highlighted on the license renewal drawings. However, the system boundaries were not changed in this process. Therefore, the license renewal drawings can be used for purposes of the scoping review (i.e., determining whether those portions of a system that perform intended functions according to 10 CFR 54.4 were included within the scope of license renewal). In other words, they are AMR drawings, but they show the boundaries of the systems that include the components necessary to perform the intended functions. Dominion will submit under oath, a statement to confirm that the AMR drawings are also license renewal boundary drawings because the boundaries were not changed when the original license renewal drawings were converted to AMR drawings.

The staff requested the applicant to confirm that the AMR drawings are also license renewal boundary drawings because the boundaries were not changed when the original license renewal drawings were converted to AMR drawings.

In its response to RAI 2.3-1, dated July 26, 2004, the applicant stated that the quotation of its statements made during the referenced teleconference is generally accurate with the following clarifications:

> The license renewal drawings were produced during the scoping and screening process and only passive, in-scope components were highlighted. The highlighted components are those that are subject to AMR, except for the components later determined to be short-lived in the AMR process, which were screened out, as stated in LRA Section 2.1.3.1.
>
> Since active components were never highlighted on the license renewal drawings, these drawings were not converted from one form to another (i.e., from original license renewal drawings to AMR drawings), as is implied in RAI 2.3-1.

The license renewal drawings were produced in order to identify components that require evaluation during the AMR process. However, since the AMR evaluation boundary shown on the drawings corresponds to the scoping boundary for the system, these drawings may also serve to indicate the in-scope portion of the system. The applicant further stated that in accordance with LRA Section 2.1.3.6, NSR piping out to the first equivalent seismic anchor point beyond the safety-related interface was not uniquely highlighted on the license renewal drawings.

Based on its review, the staff finds the applicant's response to RAI 2.3-1 acceptable, because, with the exception of short-lived components, the scoping boundaries depicted on the license renewal drawings represent the in-scope portion of the system. Therefore, the staff's concern described in RAI 2.3-1 is resolved.

On March 3, 2004, the staff held a teleconference with the applicant to discuss RAI 2.3-2 and to clarify that the license renewal drawings indicate by highlighting, those NSR components that are within the scope of license renewal solely because they have the potential for interactions with safety-related components due to their spatial orientation (i.e., 10 CFR 54.4(a)(2)). Further clarification was also requested as to whether these components were indicated differently on the license renewal drawings from those meeting the criteria of 10 CFR 54.4(a)(1). In response, the applicant stated: Portions of systems with 10 CFR 54.4(a)(2) intended functions are highlighted on the license renewal drawing. These segments are always included in the aging management program (AMP) along with the adjoining safety-related piping.

The applicant further stated that there is no distinction made on the license renewal drawings indicating those components meeting criteria 10 CFR 54.4(a)(1) and those within scope solely because they meet the criteria of 10 CFR 54.4(a)(2). They are both indicated by highlighting.

The staff requested that the applicant confirm this verbal response and clarify that all components of NSR systems capable of spatial interactions with safety-related systems (i.e., located within the same room or space) were included within the scope of license renewal and highlighted in the licensing renewal boundary drawings.

In its response to RAI 2.3-2, dated July 26, 2004, the applicant stated that its statements made during the referenced teleconference were generally accurate with the following clarifications:

Components that have been determined to be within the scope of license renewal solely because they are NSR components that are spatially oriented near safety-related structures, systems and components (SSCs) are highlighted on the license renewal drawings. These components, along with passive components meeting any of the other criteria of 10 CFR 54.4(a), are highlighted on the license renewal drawings in the same manner. There is no highlighting distinction made among the scoping criteria. The NSR components that are spatially oriented near safety-related SSCs have been determined to be within the scope of license renewal in accordance with the methodology described in LRA Section 2.1.

Based on its review, the staff finds the applicant's response to RAI 2.3-2 acceptable, because adequate explanation is given that NSR components that are spatially oriented near safety-related SSCs have been determined to be within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) and shown on license renewal drawings by highlighting. Therefore, the staff's concern described in RAI 2.3-2 is resolved.

The applicant responded to RAI 2.1-1 in its response dated November 9, 2004, Attachment 1, "Request for Additional Information Responses." In response to this RAI, the applicant revised the scoping methodology for 1) the NSR piping that is attached to safety-related piping, and 2) the NSR fluid-containing components that spatially oriented such that its failure could prevent the satisfactory accomplishment of a safety-related function of an SSC.

As a result of the implementation of the revised spatial methodology, the applicant added the following NSR systems, that were previously excluded from scope, to the Unit 2 scope of license renewal: aerated liquid radwaste; solid waste processing; water box priming; turbine building closed cooling water to the auxiliary systems, and auxiliary steam reboiler and deaerating feedwater; exciter air cooler; stator air cooler; and turbine lube oil to the steam and power conversion systems. In the November 9, 2004, response, the applicant stated that no new Millstone Unit 2 system was added due to the NSR piping attached to safety-related piping methodology changes. No new Millstone Unit 3 systems were added due to the NSR piping interaction to safety-related piping methodology changes.

By response dated December 3, 2004, the applicant provided a list of component types, with their associated intended functions, that were added to the scope of license renewal for the in-scope systems as a result of the response to RAI 2.1-1. Resulting from the methodology changes discussed above, the applicant expanded the license renewal boundaries of the following Unit 2 systems that were previously determined to be within the scope of license renewal:

Engineered Safety Features Systems:

- refueling water storage tank and containment sump (LRA Table 2.3.2-3)
- spent fuel pool cooling (LRA Table 2.3.2-5)

Auxiliary Systems:

- access control area air conditioning (LRA Table 2.3.3-13)
- chilled water (LRA Table 2.3.3-6)
- clean liquid waste processing (LRA Table 2.3.3-38)
- domestic water (LRA Table 2.3.3.33)
- instrument air (LRA Table 2.3.3-7)

- main condensers evacuation (LRA Table 2.3.3-14)
- nitrogen (LRA Table 2.3.3-8)
- primary makeup water (LRA Table 2.3.3-12)
- sampling (LRA Table 2.3.3-11)
- station air (LRA Table 2.3.3-9)
- station sumps and drains (LRA Table 2.3.3-41)

Steam and Power Conversion Systems:

- electro hydraulic control (This system is included in Unit 2 LRA Table 2.2-1 as an in-scope system, but previously had no passive mechanical components subject to aging management review. Therefore, there is no existing LRA screening results table.)
- main steam (LRA Table 2.3.4-1)

Resulting from the methodology changes discussed above, the applicant expanded the license renewal boundaries of the following Unit 3 systems that were previously determined to be within the scope of license renewal:

Engineered Safety Features Systems:

- fuel pool cooling and purification (LRA Table 2.3.2-5)
- quench spray (LRA Table 2.3.2-2)
- safety injection (LRA Table 2.3.2-3)

Auxiliary Systems:

- boron recovery (LRA Table 2.3.3-43)
- chemical and volume control (LRA Table 2.3.3-15)
- containment vacuum (LRA Table 2.3.3-23)
- radioactive gaseous waste (LRA Table 2.3.3-45)
- radioactive liquid waste processing (LRA Table 2.3.3-44)
- reactor plant aerated drains (LRA Table 2.3.3-48)
- reactor plant component cooling (LRA Table 2.3.3-4)
- reactor plant gaseous drains (LRA Table 2.3.3-49)
- reactor plant sampling (LRA Table 2.3.3-16)
- service air (LRA Table 2.3.3-14)

Steam and Power Conversion Systems:

- auxiliary boiler condensate and feedwater (LRA Table 2.3.4-7)
- auxiliary feedwater (LRA Table 2.3.4-5)
- steam generator blowdown (LRA Table 2.3.4-4)

In response to RAI 2.1-1 dated December 3, 2004, the applicant stated that the intended function limited structural integrity (LSI) applies to components within the scope of license renewal for 10 CFR 54.4(a)(2) due to either spatial orientation or non-safety attached to safety-related piping intended functions. The LSI function is combined with the pressure boundary (PB) function for components within the scope of license renewal for spatial orientation. In the November 9, 2004, response to RAI 2.1-1, Attachment 1, Table 5, "Steam and Power Conversion System – Auxiliary Steam Reboiler and Deaerating Feedwater," the applicant identified component types with the intended function of LSI only. These are within the scope of license renewal as non-safety attached to safety-related piping components. Table 5 also contains a component which is within the scope of license renewal due to implementation of the enhanced spatial orientation methodology and has the intended function of LSI and PB. Therefore, the eight new Unit 2 systems identified in the original RAI 2.1-1 response were added to the scope of license renewal based on the enhanced spatial orientation methodology. Although the steam and power conversion system – auxiliary steam reboiler and deaerating feedwater contains components with the intended function of non-safety attached to safety-related piping, no new system was added to the scope of license renewal solely for the non-safety attached to safety-related piping intended function.

None of the filtration systems nor heating ventilation and air conditioning (HVAC) systems in the Millstone 3 LRA included duct sealants or wall sealants in the applicable tables, nor were sealants indicated on LRA drawings. The staff requested in RAI SPSB-3 that the applicant clarify whether sealants were within the scope of license renewal in accordance with 10 CFR 54.4(a), and subject to aging management review in accordance with 10 CFR 54.21(a)(1). If sealants were within the scope of license renewal, the applicant was requested to update the LRA by providing the applicable information in the appropriate LRA tables. If sealants are excluded from the scope of license renewal and not subject to an AMR, the applicant was requested to provide justification for the exclusion.

In its response dated November 9, 2004, the applicant stated that duct sealants should have been included within the scope of license renewal for the Unit 3 auxiliary building ventilation system, control building ventilation system, and supplementary leak collection-and-release system and shown in LRA Table 2.3.3-18, 2.3.3-24, and 2.3.3-33, respectively. Wall sealants were evaluated as part of buildings and structures in LRA Section 2.4.2 as metal siding-caulking and were included in LRA Table 2.4.2-1. The applicant stated that sealants were not specifically identified on plant drawings.

The applicant also stated that the aforementioned ductwork joint seals perform a pressure boundary function and are subject to aging management review (AMR). The sealant is an elastomeric material and is subject to cracking and change of material properties in an air environment. The aging effects will be managed with the general condition monitoring aging management program. The staff finds this acceptable.

In the LRA for both Units 2 and 3, none of the air intake or exhaust structures included screens within the scope of license renewal. The staff requested in RAI SPSB-4 that the applicant clarify whether screens for air intake and exhaust structures were within the scope of license renewal in accordance with 10 CFR 54.4(a), and subject to aging management review in accordance with 10 CFR 54.21(a)(1). If it determined that screens for intake and exhaust structures were within the scope of license renewal, the applicant was requested to update the LRA by providing the applicable information in the appropriate tables. If it determined that screens for intake and exhaust structures were excluded from the scope of license renewal and not subject to an AMR, the applicant was requested to provide justification for the exclusion.

In its response dated November 9, 2004, the applicant stated that screens are installed over wall openings in plant structures that serve as ventilation intake or exhaust points. These screens are installed for maintenance purposes to aid in maintaining the associated ductwork free from nesting materials and debris from birds and other wildlife. Although the build-up of debris in the ventilation intakes and exhausts is not expected to affect the function of the plant ventilation systems regardless of the condition of the screens, the applicant stated that screens are not conservatively included within the scope of license renewal. The applicant further stated that screens will be included with the structural member "Miscellaneous Steel" in the LRA screening results tables for the Unit 2 auxiliary building and turbine building and the Unit 3 auxiliary building, control building, hydrogen recombiner building, engineered safety features building, main steam valve building, emergency generator enclosure and fuel oil tank vault, and circulating and service water pumphouse. The carbon steel screens are exposed to an atmosphere/weather environment. The aging effect of loss of material will be managed by the structures monitoring program. The staff found this acceptable.

2.3A Unit 2 System Scoping and Screening Results

2.3A.1 Reactor Coolant System

In LRA Section 2.3.1, the applicant identified the structures and components of the reactor coolant system (RCS) and major RCS components that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the reactor coolant system and RCS in the following sections of the LRA:

- 2.3.1.1 reactor vessel
- 2.3.1.2 reactor vessel internals
- 2.3.1.3 reactor coolant system
- 2.3.1.4 steam generator

The corresponding subsections of this SER (2.3A.1.1 - 2.3A.1.4, respectively) present the staff's related review findings.

2.3A.1.1 Reactor Vessel

2.3A.1.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.1, the applicant described the reactor vessel. The reactor vessel is a Combustion Engineering-designed, two-loop pressure vessel consisting of a cylindrical shell with a welded, hemispherical bottom head and a flanged hemispherical closure head. The reactor vessel provides a container for the reactor core and the primary coolant in which the core is submerged.

The reactor vessel directly maintains the RCS pressure boundary and supports and contains the reactor core and core support structures. Additionally, the applicant stated that the reactor vessel provides a function that supports pressurized thermal shock.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides structural and/or functional support related to mechanical components
- provides for flow distribution

In LRA Table 2.3.1-1, the applicant identified the following reactor vessel component types that are within the scope of license renewal and subject to an AMR: bottom head; control element drive mechanism (CEDM), head penetration nozzle; CEDM head penetration nozzle flange; CEDM pressure housings; closure head dome; closure head flange; closure head lifting lugs; closure head stud assembly; core stabilizing lugs and core stop lugs; flow skirt, flow baffle; head vent pipe; instrument tube flange and studs/nuts/washers; instrument tubes; intermediate and lower shell; primary nozzle and safe end; surveillance capsule holders; upper shell; and vessel flange and core support ledge.

2.3A.1.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.1, Millstone FSAR Sections 3.3.3.2 and 4.3.1, and FSAR Tables 4.3-1, 4.5-2 and 4.6-1 through 4.6-13. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.1 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's request for additional information (RAI) as discussed below.

In RAI 2.3.1.1-1(a), the staff requested the applicant to verify whether vessel support pads, which are located below the primary nozzles and provide support for the reactor vessel, were included within the scope of license renewal and are subject to an AMR, or to provide an explanation for the exclusion. In response, the applicant stated the vessel support pads are welded to three of the six primary nozzles and are within the scope of license renewal. The vessel support pads were included in the “Primary Nozzle and Safe End” subcomponent in LRA Table 2.3.1-1. Based on the inclusion of the above component, the staff finds the applicant’s response acceptable.

2.3A.1.1.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor vessel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor vessel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.1.2 Reactor Vessel Internals

2.3A.1.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.2, the applicant described the reactor vessel internals (RVIs). The RVIs are designed to support and orient the reactor core fuel assemblies and control element assemblies, absorb the control element assembly (CEA) dynamic loads and transmit these loads to the reactor vessel flange, guide the in-core instrumentation assemblies, and provide flow paths for the reactor coolant through the reactor vessel.

The RVIs support the reactor core in a coolable geometry and provide a CEA insertion path.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support related to mechanical components
- provides for flow distribution

In LRA Table 2.3.1-2, the applicant identified the following RVIs component types that are within the scope of license renewal and subject to an AMR: CEA shroud bolts; CEA shroud extension shaft guides; CEA shrouds – dual; CEA shrouds – single; core shroud assembly; core shroud tie rods; core support barrel; core support barrel alignment keys; core support barrel snubber assemblies; core support barrel upper flange; core support columns; core support plate; expansion compensating ring; fuel alignment pins; fuel alignment plate; fuel alignment plate guide lugs and guide lug inserts; incore instrumentation (ICI) support plate and guide tubes; lower support structure beam assemblies; and upper guide structure support plate.

2.3A.1.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.2, Millstone FSAR Sections 3.3.2 and 7.5.4, and FSAR Figures 3.3-9 through 3.3-14. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.1.2 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The Millstone FSAR states that ICI assemblies are inserted into the core through instrumentation nozzles in the top closure head of the reactor vessel. Each assembly is guided into position in the center of the fuel assembly via a fixed guide tube and instrument thimble assembly and a flange-type seal forms a pressure boundary for each assembly at the instrument nozzle. In RAI 2.3.1.2-1, the staff requested the applicant to verify whether instrument nozzles and instrument thimble assemblies, which provide a pressure boundary and structural support for in-scope equipment, were included within the scope of license renewal and subject to an AMR, or to provide an explanation for the exclusion. In a response dated November 9, 2004, the applicant confirmed that instrument nozzles are within the scope of license renewal and are included in the subcomponent “Instrument Tubes” and “Instrument Tube Flange and Studs/Nuts/Washers” in LRA Table 2.3.1-1. The applicant also stated that instrument thimble assemblies are within scope of license renewal and are included in the subcomponent “ICI Support Plate and Guide Tubes” in LRA Table 2.3.1-2. Based on the inclusion of the above components, the staff finds the applicant’s response acceptable.

2.3A.1.2.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor vessel internals components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor vessel internals components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.1.3 Reactor Coolant System

2.3A.1.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.3, the applicant described the reactor coolant system (RCS). The RCS is designed to contain pressurized treated water and transfer heat produced in the reactor core to the steam generators. Borated treated water is circulated through the core at a flow rate and temperature consistent with achieving the desired reactor core thermal-hydraulic performance. The RCS provides a pressure boundary for containing the primary coolant, serves to confine radioactive material, and limits the uncontrolled release of radioactive material.

The safety-related intended functions of the RCS are to provide a closed pressure boundary for containing the primary coolant, transfer heat from the reactor core to the steam generator, provide system over-pressure protection, provide Regulatory Guide (RG) 1.97 safety-related indications, ensure containment pressure boundary integrity, provide a reactor building closed cooling water system pressure boundary, and provide a means of venting non-condensable gases from system high points after an accident. The RCS contains NSR components credited for mitigating a high-energy line break and NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related (SR) function of an SR system, structure or component. The RCS also contains environmental qualification components and supports fire protection, station blackout, and pressurized thermal shock.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow
- provides a spray pattern
- provides structural and/or functional support related to mechanical components

•	limits thermal cycling

In LRA Table 2.3.1-3, the applicant identified the following RCS component types that are within the scope of license renewal and subject to an AMR: bolting; flow orifices; pipe; pressurizer; pressurizer heaters; quench tank; reactor coolant pump (RCP) motor lower lube oil coolers; RCP seal coolers; RCP thermal barriers; RCP motor upper lube oil coolers; RCPs; rupture disks; thermal sleeves; tubing; and valves.

2.3A.1.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.3, Millstone FSAR Chapter 4, and FSAR Figures 4.1-1 through 4.1-3 and 4.3-7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.3 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff’s RAIs as discussed below.

In RAI 2.3.1.3-1, the staff requested the applicant to verify whether the pressurizer components set forth in Table 2.3A-1 were included within the scope of license renewal and require an AMR or, alternatively, to provide an explanation for their exclusion.

Table 2.3A-1 Pressurizer Components that Require Additional Scoping Status Information

Subcomponent	Intended Function
Pressurizer - Nozzles (Surge, Spray, Safety, Relief, Instrument)	Pressure Boundary
Pressurizer - Nozzle Safe Ends	Pressure Boundary
Pressurizer - Heater Sheath	Pressure Boundary
Pressurizer - Manway and Cover	Pressure Boundary
Pressurizer - Surge Line	Pressure Boundary
Pressurizer - Spray Head Assembly	Spray Pattern
Pressurizer - Support Lugs	Structural Support
Pressurizer - Support Skirt and Flange	Structural Support

In a response dated November 9, 2004, the applicant confirmed that the pressurizer, including all subcomponents that perform intended functions, is included within the scope of license renewal and is subject to an AMR. The applicant further stated that the pressurizer was evaluated as part of the RCS and is not considered a major component. Therefore, pressurizer subcomponents are not listed separately in LRA Table 2.3.1-3. The applicant stated that the subcomponents listed in the table above are included in the component types “Pressurizer” and “Pressurizer Heaters” in LRA Table 2.3.1-3. Subcomponents of the pressurizer are set forth in LRA Table 3.1.2-3. Based on the inclusion of the above components, the staff finds the applicant’s response acceptable.

In RAI 2.3.1.3-2(a), the staff requested the applicant to verify whether the RCP casing and driver mount, which provide a reactor building closed-cooling-water-system pressure boundary, are within the scope of license renewal and subject to an AMR. The RCP casing, cover (including the thermal barrier), inner tubes of the seal cooler, closure bolting, and driver mount are considered part of the RCS pressure boundary. The upper and lower reactor coolant pump motor lube oil coolers and the outer tubes of the seal cooler provide a reactor building closed-cooling-water-system pressure boundary. In a response dated November 9, 2004, the applicant confirmed the RCP casing and driver mount are within the scope of license renewal and subject to an AMR. The applicant stated that these items are considered subcomponents of the RCP and are included in the component type “Reactor Coolant Pump” in LRA Table 2.3.1-3. These components are identified uniquely in LRA Table 3.1.2-3 as “Reactor Coolant Pumps (Casing)” and “Reactor Coolant Pumps (Driver Mount Assembly),” respectively. Based on the inclusion of the above components, the staff finds the applicant’s response acceptable.

In RAI 2.3.1.3-3, the staff requested the applicant to verify whether the RCS welds, which are included in the evaluation boundary for the RCS, are within the scope of license renewal and subject to an AMR. In a response dated November 9, 2004, the applicant confirmed that the RCS welds are within the scope of license renewal and require an AMR. Welds are considered a part of the host component (e.g., pipe, nozzle) and are not uniquely identified in LRA Table 2.3.1-3. Based on the inclusion of the above component, the staff finds the applicant’s response acceptable.

2.3A.1.3.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor coolant system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor coolant system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.1.4 Steam Generator

2.3A.1.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.4, the applicant described the steam generator. The nuclear steam supply system (NSSS) utilizes two steam generators to transfer the heat generated in the RCS to the secondary system and produce steam at the warranted steam pressure and quality.

The steam generator directly maintains the RCS pressure boundary, supports the capability to shut down the reactor and maintain it in a safe shutdown condition, and supports the capability to prevent or mitigate the discharge of radioactive coolant into the secondary cycle. Additionally, the steam generator provides for core heat removal in support of station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support related to mechanical components
- provides for flow distribution
- provides a pressure boundary
- limits thermal cycling
- restricts flow

In LRA Table 2.3.1-4, the applicant identified the following steam generator component types that are within the scope of license renewal and subject to an AMR: base support and flange; support brackets and lugs; divider plate; feedwater inlet ring and support; feedwater nozzle and safe end; feedwater nozzle thermal sleeve; lower head; nozzle dams and holddown rings; primary instrument nozzles; primary manway bolting; primary manway cover and diaphragm; primary nozzle and safe end; secondary manway and handhole bolting; secondary manway and handhole covers; secondary side nozzles (except steam and feedwater); shroud; steam nozzle and safe end; steam nozzle flow restrictor; top head; transition cone; tube plugs; tube support lattice bars; tube support lattice support rings; tubes; tubesheet; and upper and lower shell.

2.3A.1.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.4, Millstone FSAR Section 4.3.2, and FSAR Figure 4.3-2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.4 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In RAI 2.3.1.4-1, the staff requested the applicant to verify whether the bearing plates, which provide structural support for the steam generator and allow lateral motion due to thermal expansion of the reactor coolant piping, are within the scope of license renewal and subject to an AMR. In a response dated November 9, 2004, the applicant stated that structural supports for major RCS components are evaluated separately from the component and its integral parts as NSSS equipment supports, as described in LRA Section 2.1.5.3, Structural Screening. The applicant stated that the steam generator support structure, including the bearing plates, is included within the scope of license renewal and is described in LRA Section 2.4.3, NSSS Equipment Supports. Based on the inclusion of the above component, the staff finds the applicant's response acceptable.

2.3A.1.4.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the steam generator components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the steam generator components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.2 Engineered Safety Features Systems

In LRA Section 2.3.2, the applicant identified the structures and components of the engineered safety features (ESF) systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the ESF systems in the following sections of the LRA:

- 2.3.2.1 containment spray system
- 2.3.2.2 safety injection system
- 2.3.2.3 refueling water storage tank and containment sump system
- 2.3.2.4 shutdown cooling system
- 2.3.2.5 spent fuel pool cooling system

The corresponding subsections of this SER (2.3A.2.1 - 2.3A.2.5, respectively) present the staff's related review findings.

2.3A.2.1 Containment Spray System

2.3A.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.1, the applicant described the containment spray system. The containment spray system, in conjunction with the containment air recirculation and cooling system, removes heat from the containment atmosphere following a major primary or secondary pipe rupture inside containment. Heat is transferred to the reactor building closed cooling water system via the shutdown cooling heat exchangers.

The containment spray system provides heat removal from containment, RG 1.97 safety-related indications, and containment pressure boundary integrity. The containment spray system also contains environmental qualification components and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow
- provides a spray pattern

In LRA Table 2.3.2-1, the applicant identified the following containment spray system component types that are within the scope of license renewal and subject to an AMR: bolting; CS pump seal coolers; flow orifices; pipe; pumps; spray nozzles; tubing; and valves.

2.3A.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.1 and Millstone FSAR Section 6.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.2.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment spray system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment spray system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.2.2 Safety Injection System

2.3A.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.2, the applicant described the safety injection system. The purpose of the safety injection system is to provide a source of borated water to the RCS to ensure that the reactor is shutdown and to cool the core in the event of a design-basis accident. The safety injection system consists of the high-pressure safety injection subsystem, the low-pressure safety injection subsystem, and the safety injection tanks.

The safety injection system provides injection of borated water into the RCS following an accident, for control of reactor core boron precipitation during long-term loss-of-coolant accident (LOCA) recovery, reactor decay heat removal during shutdown conditions, refueling water storage tank (RWST) isolation, RCS pressure-boundary integrity, containment pressure boundary integrity, and an RG 1.97 safety-related indications. The safety injection system contains NSR components credited for mitigating the effects of a high-energy line break. The safety injection system contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow

In LRA Table 2.3.2-2, the applicant identified the following safety injection system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; flow orifices; high pressure safety injection (HPSI) pump seal coolers; low-pressure safety injection (LPSI) pump seal coolers; pipe; pumps; safety injection tanks; tubing; and valves.

2.3A.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.2 and Millstone FSAR Section 6.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.2.2.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the safety injection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the safety injection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.2.3 Refueling Water Storage Tank and Containment Sump System

2.3A.2.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.3, the applicant described the refueling water storage tank and containment sump system. The refueling water storage tank (RWST) provides the initial source of borated water for the safety injection and containment spray pumps. The containment sump collects water following a LOCA for recirculation after the RWST has emptied. Vortex breakers are installed in the safety injection and containment spray pumps suction from the RWST and from the containment sump to prevent pump suction air entrainment. The RWST and containment sump system also includes an encapsulation feature provided for the sump recirculation lines and isolation valves outside of the containment. The encapsulation feature limits the potential fluid releases from the recirculation piping and valves at the containment wall penetration. Containment sump water pH level is controlled by baskets of dissolvable trisodium phosphate dodecahydrate (TSP).

The RWST and containment sump system provides a source of water to the safety injection and containment spray pumps, sump water pH control, RG 1.97 safety-related indications, and containment pressure boundary integrity. The system also supports RCS inventory and reactivity control, decay heat removal make-up, and spent fuel pool inventory control during shutdown conditions. The RWST and containment sump system contains NSR components credited for mitigating the effects of a high-energy line break. The RWST and containment sump system also contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides structural and/or functional support related to mechanical components
- provides for vortex suppression

In LRA Table 2.3.2-3, the applicant identified the following RWST and containment sump system component types that are within the scope of license renewal and subject to an AMR: bolting; circulating pump; encapsulation piping; encapsulation valves; expansion joints; heat exchanger; pipe; refueling water storage tank; rupture disks; TSP baskets; tubing; valves; and vortex breakers.

2.3A.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.3 and Millstone FSAR Section 6.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.2.3 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff’s RAI as discussed below.

The Millstone FSAR states the containment sump is protected from clogging by the sump screens. Sump screens are normally used in the containment sump which provides water for the RWST recirculation phase and one of the intended functions is to protect the pumps from debris and cavitation due to harmful vortex following a LOCA. In RAI 2.3.2.3-1, the staff requested the applicant to verify whether sump screens are within the scope of license renewal and subject to an AMR. In a response dated November 9, 2004, the applicant confirmed that the containment sump screens are within the scope of license renewal and subject to an AMR. The applicant further stated that the sump screens are identified LRA Table 2.4.1-1. Based on the inclusion of the above component, the staff finds the applicant's response acceptable.

2.3A.2.3.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the refueling water storage tank and containment sump system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the refueling water storage tank and containment sump system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.2.4 Shutdown Cooling System

2.3A.2.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.4, the applicant described the shutdown cooling system. The shutdown cooling system transfers heat from the RCS to the reactor building closed cooling water system, via the shutdown cooling system heat exchangers, during plant cooldown operations. The shutdown cooling system also provides heat removal from recirculated containment sump water during the recirculation phase of accident recovery.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration
- restricts flow

In LRA Table 2.3.2-4, the applicant identified the following shutdown cooling system component types that are within the scope of license renewal and subject to an AMR: bolting; carry-over tank; filter/strainers; flexible hoses; flow elements; pipe; restricting orifices; shutdown cooling heat exchangers; tubing; vacuum flask; vacuum pump; and valves.

2.3A.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.4 and Millstone FSAR Section 9.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended

functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.2.4.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the shutdown cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the shutdown cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.2.5 Spent Fuel Pool Cooling System

2.3A.2.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.5, the applicant described the spent fuel pool cooling system. The spent fuel pool cooling system removes decay heat generated by spent fuel assemblies stored in the spent fuel pool. Heat is transferred from the pool water to the reactor building closed cooling water system.

The spent fuel pool cooling system provides heat removal from the spent fuel pool and containment pressure boundary integrity. The evaluation boundary includes the spent fuel pool cooling system components that provide cooling for the spent fuel pool.

The system's intended function, within the scope of license renewal, is to provide a pressure boundary.

In LRA Table 2.3.2-5, the applicant identified the following spent fuel pool cooling system component types that are within the scope of license renewal and subject to an AMR: bolting; expansion joints; flow elements; pipe; pumps; spent fuel pool heat exchangers; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the spent fuel pool cooling system. In its December 23, 2004, RAI response, the applicant identified the following component types that were added to the scope of the spent fuel pool cooling system:

- filters
- mixing tank

2.3A.2.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.5 and Millstone FSAR Section 9.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The Millstone FSAR states that in the event that a serious leak develops in the spent fuel pool liner, makeup water is supplied to the pool from the primary makeup water system by manual initiation from the 14-foot 6-inch level of the auxiliary building, and that should the leakage exceed the 50-GPM normal makeup capability, additional makeup is available from the RWST via the refueling water purification system and the fire protection system by temporary hose connections. The license renewal drawing for the spent fuel pool cooling system shows only the portions of the primary makeup water system and RWST that have a certain specification as subject to an AMR. It appeared to the staff that these makeup paths are required or relied upon to provide makeup capability to the spent fuel pool. In RAI 2.3.2.5-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the additional sources of fuel pool makeup from the primary makeup water system and from the RWST from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the spent fuel pool is a missile-protected, seismically-designed reinforced concrete structure with a stainless steel liner. As stated in Millstone FSAR Section 9.5.3.3, failure of the structure is not considered credible. All connections to the spent fuel pool penetrate the pool walls near the normal operating level, or are provided with anti-siphon devices, to prevent gravity draining of the pool due to system leaks. The applicant stated that the spent fuel pool liner is within the scope of license renewal and is managed for the effects of aging, as described in LRA Section 2.4.2.2, such that significant leakage is not expected. The loss of inventory from the spent fuel pool is not analyzed as an accident for the plant. The FSAR discusses the possibility of spent fuel pool inventory loss and lists several sources of make-up water for completeness. The RWST has been identified with the intended function to provide spent fuel inventory control in LRA Section 2.3.2.3. Additionally, the components that comprise the make-up flow path from the refueling water storage tank via the safety injection pumps and the shutdown cooling system, as discussed in Millstone FSAR Section 9.5.3.3, are included within the scope of license renewal. Other sources of make-up water are available but are not assigned spent fuel pool make-up as an intended function. Consequently, the spent fuel pool make-up flow paths from the primary makeup water system and from the RWST via the refueling water purification system are not within the scope for their spent fuel pool make-up capability.

The staff finds the applicant's response to RAI 2.3.2.5-1A acceptable, because the applicant explained that a source of make-up to the fuel pool from the refueling water storage tank is credited for this purpose in the FSAR and is within the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.2.5-1A is resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and

December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the spent fuel pool cooling system is acceptable.

2.3A.2.5.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the spent fuel pool cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the spent fuel pool cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3 Auxiliary Systems

In LRA Section 2.3.3, the applicant identified the structures and components (SCs) of the auxiliary systems that are subject to an AMR for license renewal.

The applicant described the supporting SCs of the auxiliary systems in the following sections of the LRA:

- 2.3.3.1 circulating water system
- 2.3.3.2 screen wash system
- 2.3.3.3 service water system
- 2.3.3.4 sodium hypochlorite system
- 2.3.3.5 reactor building closed cooling water system
- 2.3.3.6 chilled water system
- 2.3.3.7 instrument air system
- 2.3.3.8 nitrogen system
- 2.3.3.9 station air system
- 2.3.3.10 hydrogen system
- 2.3.3.11 chemical and volume control system
- 2.3.3.12 sampling system
- 2.3.3.13 primary makeup water system
- 2.3.3.14 access control area air conditioning system
- 2.3.3.15 main condensers evacuation system
- 2.3.3.16 containment air recirculation and cooling system
- 2.3.3.17 containment and enclosure building purge system
- 2.3.3.18 containment penetration cooling
- 2.3.3.19 containment post-accident hydrogen control
- 2.3.3.20 control room air conditioning system
- 2.3.3.21 control element drive mechanism cooling system
- 2.3.3.22 diesel generator ventilation system
- 2.3.3.23 ESF room air recirculation system

- 2.3.3.24 enclosure building filtration system
- 2.3.3.25 fuel handling area ventilation system
- 2.3.3.26 main exhaust ventilation system
- 2.3.3.27 non-radioactive area ventilation system
- 2.3.3.28 process and area radiation monitoring system
- 2.3.3.29 radwaste area ventilation system
- 2.3.3.30 turbine building ventilation system
- 2.3.3.31 vital switchgear ventilation system
- 2.3.3.32 Unit 2 fire protection system
- 2.3.3.33 Unit 3 fire protection system
- 2.3.3.34 domestic water system
- 2.3.3.35 diesel generator system
- 2.3.3.36 diesel generator fuel oil system
- 2.3.3.37 station blackout diesel generator system
- 2.3.3.38 security system
- 2.3.3.39 clean liquid waste processing
- 2.3.3.40 gaseous waste processing system
- 2.3.3.41 post-accident sampling system
- 2.3.3.42 station sumps and drains system

The corresponding subsections of this SER (2.3A.3.1 - 2.3A.3.42, respectively) present the staff's review findings.

2.3A.3.1 Circulating Water System

2.3A.3.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.1, the applicant described the circulating water system. The circulating water system provides a supply of cooling water to the main condenser via four one-fourth capacity vertical wet-pit pumps, which circulate water from the intake structure through the main condenser to the discharge structure. The circulating water pumps take suction on Long Island Sound. A warm water recirculation flowpath is provided to circulate condenser outlet water to the intake structure to reduce ice formation.

The circulating water system provides warm water recirculation to the intake structure for de-icing to ensure service water system availability and contains level switches that are used to shut down the circulating water pumps to prevent flooding in the turbine building. The system also contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-1, the applicant identified the following circulating water system component types that are within the scope of license renewal and subject to an AMR: expansion joints; pipe; and valves.

2.3A.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.1 and Millstone FSAR Section 9.7.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the circulating water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the circulating water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.2 Screen Wash System

2.3A.3.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.2, the applicant described the screen wash system. The screen wash system provides a source of water to clear debris from the traveling water screens at the intake structure. The system is comprised of two screen wash pumps, strainers, piping, and valves.

The screen wash system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-2, the applicant identified the following screen wash system component types that are within the scope of license renewal and subject to an AMR: pipe; pumps; strainers; tubing; and valves.

2.3A.3.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.2 and Millstone FSAR Section 9.7.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.2 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review the staff noted that a license renewal drawing showed screen wash pump casing drain lines outside the scope of license renewal and excluded from being subject to an AMR. The drain lines serve a pressure boundary intended function, and are passive and long-lived and should be within scope for license renewal and subject to an AMR. In RAI 2.3.3.2-1A, the staff requested the applicant to clarify that these components are within the scope of license renewal and subject to an AMR, or explain their exclusion.

In its response, dated July 26, 2004, the applicant concluded that the pump casing drain lines shown on the license renewal drawing are pump shaft packing leak-off lines and are normally dry and not pressurized. Upon further review, the applicant concluded that these lines should be included within the scope of license renewal for 10 CFR 54.4(a)(2) and revised Table 2.3.3-2 to include the lines. The applicant stated that the aging effect of loss of material (external) will be managed with the general condition monitoring AMP and the aging effect of loss of material (internal) will be managed with the work control process AMP.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.2-1A acceptable, because the pump casing drain lines are included in the scope of license renewal and will be managed appropriately. Therefore, the staff's concern described in RAI 2.3.3.2-1A is resolved.

2.3A.3.2.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the screen wash water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the screen wash water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.3 Service Water System

2.3A.3.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.3, the applicant described the service water (SW) system. The purpose of the SW system is to provide a dependable flow of cooling water to the following safety-related and NSR loads:

- reactor building closed cooling water heat exchangers
- turbine building closed cooling water heat exchangers
- emergency diesel generator heat exchangers
- vital AC switchgear room cooling coils
- DC switchgear room vital chillers

The SW system provides cooling water flow to safety-related heat loads to transfer rejected heat to the ultimate heat sink and isolation of NSR heat loads in the event of a design basis accident. The SW system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also contains NSR components credited for mitigating a high-energy line break (HELB) accident. The SW system contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration
- provides limited structural integrity
- restricts flow

In LRA Table 2.3.3-3, the applicant identified the following SW system component types that are within the scope of license renewal and subject to an AMR: expansion joints; filter/strainers; flow elements; flow indicators; flow orifices; pipe; pumps; restricting orifices; SW pump motor protective tank; tubing; and valves.

2.3A.3.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.3 and Millstone FSAR Sections 6.1.2.1, 8.2.3.3, 8.3.2.2, 9.4.3.1, 9.7.2, and 14.8.2.2.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.3 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing shows the SW strainer overflow lines outside the scope of license renewal and excluded from being subject to an AMR. Failure of the overflow line may cause the SW to flow to the outside of the strainer and on safety-related components in the intake structure. In RAI 2.3.3.3-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of these drain lines from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the overflow lines are the service water strainers’ packing leakoff lines, which direct strainer shaft leakage to a floor drain. These lines are in a normally dry condition. However, if a packing leak does occur, moisture will be present, creating the potential to wet safety-related components. The applicant concluded that these lines should be included within the scope of license renewal and revised LRA Table 2.3.3-3 to include the packing leakoff lines. The applicant stated that the aging effect of loss of material (external) will be managed with the general condition monitoring AMP and the aging effect of loss of material (internal) will be managed with the service water system (Open-Cycle Cooling) AMP.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.3-1A acceptable, because the strainer leakoff lines are included within the scope of license renewal and will be managed appropriately. Therefore, the staff’s concern described in RAI 2.3.3.3-1A is resolved.

Table 2.3.3-3 lists “SW Pump Motor Protective Tank” as a component type within the scope of license renewal and subject to an AMR. This stored component protects the SW pumps or other safety-related components from failing to perform their intended functions. In RAI 2.3.3.3-2A dated June 9, 2004, the applicant was asked to provide drawings or descriptive information that would allow the staff to determine whether the subcomponents of the “SW Pump Motor Protective Tank,” were adequately identified in Table 2.3.3-3.

In its response, dated July 26, 2004, the applicant stated that the SW pump motor is protected from flooding by shrouding the motor with a fiberglass tank “can” that fits over the vertical motor. The SW pump motor protective tank is a stored piece of equipment that is designed to protect one SW pump motor from damage due to flooding during a postulated maximum hurricane. The fiberglass tank is equipped with a steel lifting rig to facilitate installation of the tank. The fiberglass tank provides the flood protection intended function. The lifting rig is not required to prevent flooding damage to the SW pump motor and is not within the scope of license renewal.

The staff finds the applicant’s response to RAI 2.3.3.3-2A acceptable, because it adequately describes the SW pump motor protective tank and its use. The description allows the staff to conclude that this component was correctly identified within the scope of license renewal and subject to an AMR. Therefore, the staff’s concern described in RAI 2.3.3.3-2A is resolved.

2.3A.3.3.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.4 Sodium Hypochlorite System

2.3A.3.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.4, the applicant described the sodium hypochlorite system. The sodium hypochlorite system provides a source of sodium hypochlorite to minimize marine growth in the SW system and the circulating water system.

The sodium hypochlorite system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-4, the applicant identified the following sodium hypochlorite system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

2.3A.3.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.4 and Millstone FSAR Section 9.7.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.4.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the sodium hypochlorite system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the sodium hypochlorite system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.5 Reactor Building Closed Cooling Water System

2.3A.3.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.5, the applicant described the reactor building closed cooling water (RBCCW) system. The RBCCW system is a closed loop cooling system that transfers heat from reactor auxiliaries to the service water system during plant operation and accident conditions.

The RBCCW system transfers heat from safety-related heat loads to the ultimate heat sink, providing automatic and manual isolation of non-essential heat loads in the event of a design basis accident, and providing containment pressure boundary integrity. The reactor building closed cooling water system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow
- provides limited structural integrity
- provides for heat transfer

In LRA Table 2.3.3-5, the applicant identified the following reactor building closed cooling water system component types that are within the scope of license renewal and subject to an AMR: flow elements; flow indicators; flow orifices; flow switches; pipe; pumps; RBCCW heat exchangers; RBCCW surge tank; reactor vessel support concrete cooling coils; tubing; and valves.

2.3A.3.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.5 and Millstone FSAR Sections 9.2.2.2, 9.3.2.2, 9.4, 9.7.2.1.1, 9.9.1.2.1, and 9.10.6.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.5 identified areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

One of the license renewal drawings reviewed by the staff shows flexible hoses and a sample cooler within the RBCCW system within the scope of license renewal and subject to an AMR. However, these components were not listed in LRA Table 2.3.3-5 as a component type subject to an AMR. In RAI 2.3.3.5-A, dated June 9, 2004, the staff requested the applicant to explain whether these components were included with another component type or to explain their exclusion from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that flexible hoses are within the scope of license renewal, but have been determined to be short-lived components. As described in LRA Section 2.1 5.1, short-lived components are shown on the license renewal drawings. However, the applicant stated that these short-lived components are not subject to an AMR and are not included in the screening results tables provided in Section 2 of the LRA. The applicant further stated that modified preventive maintenance program procedures will require the periodic replacement of the flexible hoses based on a specified time frequency. Also, the applicant stated that the sample cooler is within the scope of license renewal and is included in the component type "Sample Coolers" in LRA Table 2.3.4-10, which is within the plant heating and condensate recovery system.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.5-1A acceptable because the applicant clarified that the flexible hoses and sample cooler are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a) and the flexible hoses will be replaced by preventive maintenance program procedures that have been modified such that the replacement is performed at a specified time frequency. Also, the applicant clarified that the sample cooler is included in the component type "Sample Coolers" in LRA Table 2.3.4-10 subject to an AMR. Based upon the applicant's response, the components discussed in this RAI adequately meet the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.5-1A is resolved.

Another license renewal drawing showed lines to several temperature indicating controllers (TICs) within the RBCCW system, that appeared to fall within the scope of license renewal and subject to an AMR. The lines provide a temperature signal to the controls of several temperature control valves. These lines appear to be electrical wires. In RAI 2.3.3.5-2A dated June 9, 2004, the staff requested the applicant to clarify whether the lines have been correctly included within the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the temperature sensing lines highlighted between the RBCCW system piping and the respective temperature control valves are capillary tubing. The capillary tubing performs its function without penetrating the RBCCW piping. The lines highlighted between the control circuits of the temperature control valves and the temperature indicating controllers are pneumatic signal tubing. Failure of neither the capillary tubing, the temperature control valve positioners, nor the pneumatic circuits affect the ability of the RBCCW system from performing its intended functions and are therefore not within the scope of license renewal. The applicant explained that the capillary tubing and pneumatic signal tubing were inadvertently highlighted on the license renewal drawings.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.5-2A acceptable because it provided adequate explanation of the capillary and pneumatic tubing functions and how it was inadvertently highlighted on the license renewal drawing. The staff concludes that the tubing was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.5-2A is resolved.

2.3A.3.5.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the RBCCW components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the RBCCW components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.6 Chilled Water System

2.3A.3.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.6, the applicant described the chilled water system. The chilled water system consists of the auxiliary chilled water subsystem that functions during normal operation and the vital chilled water subsystem that is normally in stand-by for use in the event of an accident. The chilled water system is a closed-loop system that provides cooling water for the vital switchgear ventilation system and various NSR plant cooling requirements. The auxiliary chilled water subsystem automatically isolates from the vital chilled water subsystem in an emergency, and the vital chilled water subsystem supplies the vital switchgear ventilation system.

The chilled water system provides chilled water to the vital switchgear ventilation system and isolation of the NSR portion of the system during an accident. The chilled water system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides for heat transfer
- provides a pressure boundary
- provides filtration
- provides limited structural integrity

In LRA Table 2.3.3-6, the applicant identified the following chilled water system component types that are within the scope of license renewal and subject to an AMR: chilled water chillers; chilled water evaporators; chilled water surge tank; compressor casings; filter/strainers; flow elements; level indicators; moisture indicators; pipe; pumps; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the chilled water system. In its December 3, 2004, RAI response, the applicant identified the non-vital chiller component type that was added to the scope of the chilled water system.

2.3A.3.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.6 and Millstone FSAR Sections 9.7.2.1.1, 9.9.16, and 9.9.17. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.6 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAIs as discussed below.

In its review, the staff noted that a license renewal drawing for the chilled water system showed a symbol representing components that is not identified on the license renewal drawing legend. Therefore, the staff was not able to ensure that LRA Table 2.3.3-6 is complete. In RAI 2.3.3.6-1A, dated June 9, 2004, the staff requested the applicant to define the symbol for these components and to clarify whether they penetrate the chilled water system piping pressure boundary.

In its response, dated July 26, 2004, the applicant stated that the unidentified components are moisture filters and that they are part of the chilled water system pressure boundary. The applicant stated that the components are within the scope of license renewal and are included in the component type "Filters/Strainers" in LRA Table 2.3.3-6.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.6-1A acceptable because the moisture filters were identified and properly placed within the scope of license renewal. The staff concludes that the moisture filters were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.6-1A is resolved.

LRA Table 2.3.3-6 listed “Chilled Water Chillers” and “Chilled Water Evaporators” as component types subject to an AMR. During its review, the staff determined that evaporator and chiller shells, shown on a license renewal drawing for the chilled water system, perform a pressure boundary intended function and are within the scope of license renewal and subject to an AMR. In RAI 2.3.3.6-2A, dated June 9, 2004, the staff requested the applicant to confirm that the evaporator and chiller shells are included with the components listed in LRA Table 2.3.3-6.

In its response, dated July 26, 2004, the applicant stated that the component types "Chilled Water Chillers" and "Chilled Water Evaporators" include the chiller and evaporator shells in LRA Table 2.3.3-6. The tubing and shell of the chilled water chillers and chilled water evaporators are identified as individual components for aging management in LRA Table 3.3.2-6.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.6-2A acceptable because the shells of the chillers and evaporators were considered to be part of the components in the chilled water system. The staff concludes that the shells were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.6-2A is resolved.

In its review, the staff noted that a license renewal drawing for the chilled water system showed that the lower half of the chilled water surge tank is divided into two equal sections by a vertical weir. The surge tank weir was not shown to be within the scope of license renewal and was excluded from being subject to an AMR. The vertical weir in the surge tank assures that chilled water will be available to supply vital portions of the system, if one of the two independent supply lines ruptures. In RAI 2.3.3.6-3A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the vertical weir from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the vertical weir located inside of the chilled water surge tank was inadvertently not highlighted, but is within the scope of license renewal. The applicant stated that the vertical weir was evaluated as an integral part of the component type, "Chilled Water Surge Tank" shown in LRA Table 2.3.3-6.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.6-3A acceptable because the vertical weir within the chilled water surge tank was considered as a component in the chilled water system. The staff concludes that the vertical weir was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.6-3A is resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the chilled water system is acceptable.

2.3A.3.6.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the chilled water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified chilled water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.7 Instrument Air System

2.3A.3.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.7, the applicant described the instrument air system. The instrument air system provides a reliable source of clean, dry, oil-free compressed air at the proper pressure to supply air-operated valves, instruments, and other miscellaneous components in the plant. The instrument air system is cross-connected with the station air system.

The instrument air system provides containment pressure boundary integrity and backup compressed air for operation of certain safety-related components. The instrument air system also includes environmental qualification equipment and supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-7, the applicant identified the following instrument air system component types that are within the scope of license renewal and subject to an AMR: accumulators; hoses; pipe; regulators; tubing; and valves. In addition, as a result of the scoping methodology changes in response to RAI 2.1-1, described in the November 9, 2004, response, the applicant expanded the system boundaries for the instrument air system. Specifically, in its December 3, 2004, response, the applicant identified the following component types that were added to the scope of the instrument air system:

- compressors
- compressor aftercoolers
- containment instrument air receiver tank

2.3A.3.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.7 and Millstone FSAR Sections 5.2 and 9.1.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.7 identified areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

LRA Section 2.3.3.7 states that the instrument air system is within the scope of license renewal because it provides containment pressure boundary integrity and backup compressed air for the operation of certain safety-related components. Where required, the backup compressed air source is supplied from an installed accumulator. The Millstone FSAR references a list of all safety-related pneumatically actuated valves including those with an air accumulator. In RAI 2.3.3.7-1A, the staff requested additional information to complete its review:

- The staff requested the applicant to identify those listed valves that have accumulators.
- The accumulator and associated tubing was shown in the application to be subject to an AMR for eight valves not identified in the list. The staff requested the applicant to verify the accuracy of the list.
- A license renewal drawing for the instrument air system showed accumulators and associated tubing leading to a note stating, "TO 2-MS-64A and "TO 2-MS-64B." The staff took the position that these valves are provided with backup air accumulators and should be identified with within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a). However, the instrument air line to these valves was not shown to be subject to an AMR. The staff requested the applicant to explain the apparent exclusion of the instrument air line from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated:

(1) The valves listed are the safety-related pneumatic actuated valves necessary for safe shutdown. The applicant reviewed the list of values and determined that there are no additional valves with air accumulators other than those listed in the RAI.

(2) The eight valves identified in the RAI that have air accumulators and tubing subject to AMR, but are not identified in the list represented a discrepancy that has been documented in the plant Corrective Action System.

(3) The pneumatic lines shown on an instrument air license renewal drawing are an extension of "test lines" that originate on another drawing that is not a license renewal drawing. The applicant stated that these "test lines" do not perform an intended function and are not within the scope of license renewal.

The staff finds the applicant's response to RAI 2.3.3.7-1A acceptable because the questions arising from the comparison of the list of air operated valves and those found on license renewal drawings were adequately resolved by the applicant. The staff concludes that the components in the instrument air system were scoped in accordance with the requirements of

10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concerns described in RAI 2.3.3.7-1A are resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the instrument air system is acceptable.

2.3A.3.7.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the instrument air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the instrument air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.8 Nitrogen System

2.3A.3.8.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.8, the applicant described the nitrogen system. The nitrogen system provides clean, dry gas that is utilized in multiple applications throughout the plant. The nitrogen system provides a pressure boundary for the safety injection system.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-8, the applicant identified the following nitrogen system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the nitrogen system. In its December 3, 2004, RAI response, the applicant identified the flow indicators component type that was added to the scope of the nitrogen system.

2.3A.3.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.8 and Millstone FSAR Section 6.3.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the nitrogen system is acceptable.

2.3A.3.8.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the nitrogen system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the nitrogen system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.9 Station Air System

2.3A.3.9.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.9, the applicant described the station air system. The station air system provides a source of clean, oil-free compressed air at the proper pressure to support the operation of air-operated tools and other devices. The station air system can be used as a source of compressed air to the instrument air system. The station air system also provides air pressure to support dry pipe fire protection sprinkler systems.

The station air system provides a containment pressure boundary integrity. The station air system also provides a pressure boundary for the fire protection water suppression system.

The intended function within the scope of license renewal includes providing pressure boundary.

In LRA Table 2.3.3-9, the applicant identified the following station air system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the station air system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the station air system:

- compressors
- air compressor aftercoolers
- air compressor intercoolers

2.3A.3.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.9 and Millstone FSAR Section 9.1.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the station air system is acceptable.

2.3A.3.9.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the station air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the station air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.10 Hydrogen System

2.3A.3.10.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.10, the applicant described the hydrogen system. The hydrogen system provides a source of hydrogen gas for the main generator and volume control tank. The system is comprised of primary and reserve gas cylinders located outside of the turbine building on the hydrogen bulk storage skid. An excess flow valve, located outside of the turbine building, isolates hydrogen flow in the event of a line failure within the turbine building in order to mitigate the spread of fire.

The hydrogen system provides for fire mitigation.

The applicant identified no component groups that require aging management review.

2.3A.3.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.10 and Millstone FSAR Section 10.2.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.10.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant adequately identified that the hydrogen system is within the scope of license renewal, as required by 10 CFR 54.4(a), but there are no components subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.11 Chemical and Volume Control System

2.3A.3.11.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.11, the applicant described the CVCS. The CVCS provides a method for controlling the inventory and chemistry of the RCS. During normal operation, reactor coolant letdown flow is cooled; conditioned via ion exchangers, filters, and chemical addition; heated; and returned to the RCS. The system also provides the capability to adjust reactor coolant soluble boron concentration in order to effect reactivity changes within the reactor core. During emergency conditions, the CVCS provides a high-pressure source of borated water injection to the RCS.

The CVCS provides a borated water flowpath to the RCS for reactivity control and for make-up in the event of an accident. The system also provides an RCS pressure boundary at system interfaces; safety-related RG 1.97 indications; and containment penetration pressure boundary integrity. The CVCS contains NSR components credited for mitigating the effects of a high-energy line break and NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The CVCS also contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-10, the applicant identified the following CVCS component types that are within the scope of license renewal and subject to an AMR: bolting; boric acid tanks; filter/strainers; flow elements; flow indicators; letdown heat exchanger; level indicators; lube oil reservoirs; pipe; pulsation dampeners; pumps; regenerative heat exchanger; suction stabilizers; sump tanks; tubing; valves; and volume control tank.

2.3A.3.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.11 and Millstone FSAR Section 9.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.11.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the CVCS components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the CVCS components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.12 Sampling System

2.3A.3.12.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.12, the applicant described the sampling system. The sampling system provides the means for determining chemical and radiological conditions of plant processes and environments.

The sampling system provides the capability to obtain post-accident samples, providing a pressure boundary at interfaces with safety-related systems, and providing safety-related RG 1.97 indications. The sampling system contains NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The sampling system also contains environmental qualification equipment.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-11, the applicant identified the following sampling system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe, sample coolers; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the sampling system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the sampling system:

- sample chiller
- secondary sample station/sink

2.3A.3.12.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.12 and Millstone FSAR Section 9.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant’s responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant’s December 3, 2004, response related to the scoping and screening results of the sampling system is acceptable.

2.3A.3.12.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the sampling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the sampling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.13 Primary Makeup Water System

2.3A.13.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.13, the applicant described the primary makeup water system. The primary makeup water system, which is part of the water treatment system, provides demineralized water for use in primary and auxiliary systems in the plant.

The primary makeup water system provides containment penetration pressure boundary integrity and safety-related RG 1.97 indications. The primary makeup water system contains NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The primary makeup water system also contains environmental qualification equipment.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-12, the applicant identified the following primary makeup water system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; pipe; primary water head tank; pumps; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the primary makeup water system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the primary makeup water system:

- makeup water vacuum dearator
- primary water storage tank
- dearator water transfer pump

2.3A.3.13.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.13 and Millstone FSAR Section 9.12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the primary makeup water system is acceptable.

2.3A.3.13.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the primary makeup water components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the primary makeup water components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.14 Access Control Area Air Conditioning System

2.3A.3.14.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.14, the applicant described the access control area air conditioning system. The access control area air conditioning system provides for heating and cooling of office spaces. The system contains fire dampers to prevent the spread of fire. Therefore, the access control area air conditioning system supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-13, the applicant identified the following access control area air conditioning system component type that is within the scope of license renewal and subject to an AMR: damper housings.

2.3A.3.14.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.14 and Millstone FSAR Section 9.9.13. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended

functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.14.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the access control area air conditioning system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the access control area air conditioning system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.15 Main Condensers Evacuation System

2.3A.3.15.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.15, the applicant described the main condensers evacuation system. The main condensers evacuation system includes two steam-jet air ejector units, complete with inter- and after-condensers, which remove air and noncondensable gases from the main condenser. A mechanical vacuum pump is provided for use during startup. Air ejector condenser cooling is provided by condensate flow. Air in-leakage and noncondensable gases are removed from the condenser and discharged to the stack, which is continuously monitored for radioactivity.

The main condensers evacuation system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-14, the applicant identified the following main condensers evacuation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; and pipe and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the main condensers evacuation system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the main condensers evacuation system:

- flow orifices
- flow switches
- filter/strainers
- steam jet air ejector vent condenser

2.3A.3.15.2 Staff Evaluation

The staff reviewed LRA Section. 2.3.3.15 and Millstone FSAR Section 10.4.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the containment air recirculation and cooling system is acceptable.

2.3A.3.15.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the main condensers evacuation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the main condensers evacuation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.16 Containment Air Recirculation and Cooling System

2.3A.3.16.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.16, the applicant described the containment air recirculation and cooling system. The function of the containment air recirculation and cooling system is to remove heat from the containment atmosphere during normal operation and after an accident. In the event of a LOCA or MSLB accident, the system provides a means of cooling the containment atmosphere to reduce containment pressure, which minimizes the potential for leakage of airborne particulate and gaseous radioactivity from containment.

The containment air recirculation and cooling system provides heat removal from the containment after an accident, providing containment pressure boundary integrity, and RG 1.97 safety-related indications and signals. The containment air recirculation and cooling system also contains environmental qualification equipment and supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-15, the applicant identified the following containment air recirculation and cooling system component types that are within the scope of license renewal and subject to an AMR: containment air recirculation cooling unit coils; containment air recirculation cooling unit housings; damper housings; ductwork; fan/blower housings; flow elements; pipe; tubing; and valves.

2.3A.3.16.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.16 and Millstone FSAR Section 6.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.16.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment air recirculation and cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment air recirculation and cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.17 Containment and Enclosure Building Purge System

2.3A3.17.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.17, the applicant described the containment and enclosure building purge system. The containment and enclosure building purge system functions to maintain a suitable environment for personnel access into the containment and enclosure building. The purge system provides fresh air ventilation, and heating when required; and it is balanced to maintain a negative pressure in the area being purged. The system contains fire dampers to mitigate a fire.

The containment and enclosure building purge system provides automatic isolation and alignment of the system on an actuation signal and provides containment pressure boundary integrity. The containment and enclosure building purge system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-16, the applicant identified the following containment and enclosure building purge system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; flex connections; pipe; and valves.

2.3A.3.17.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.17 and Millstone FSAR Section 9.9.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.17.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment and enclosure building purge system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment and enclosure building purge system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.18 Containment Penetration Cooling System

2.3A.3.18.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.18, the applicant described the containment penetration cooling system. The containment penetration cooling system functions to limit the temperature of containment structure concrete to 150 °F in the vicinity of hot piping penetrations. The system consists of two vane-axial fans and the associated system ductwork and dampers. The system contains fire dampers to prevent the spread of a fire.

The containment penetration cooling system provides cooling air to the concrete area surrounding the containment piping penetrations. The containment penetration cooling system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-17, the applicant identified the following containment penetration cooling system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; fan/blower housings; and flex connections.

2.3A.3.18.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.18 and Millstone FSAR Section 9.9.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.18.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment penetration cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment penetration cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.19 Containment Post-Accident Hydrogen Control System

2.3A.3.19.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.19, the applicant described the containment post-accident hydrogen control system. The containment post-accident hydrogen control system includes independent, fully redundant subsystems to mix, monitor, and reduce the hydrogen concentration in containment following a loss-of-coolant accident (LOCA). The system functions to maintain the concentration of hydrogen in the containment below the lower flammability limit following a LOCA.

The containment post-accident hydrogen control system is within the scope of license renewal because the system controls the concentration of hydrogen in containment after an accident to below the lower flammability limit following a LOCA, provides containment pressure boundary integrity, and provides RG 1.97 safety-related indications and signals. The containment post-accident hydrogen control system also contains environmental qualification equipment.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-18, the applicant identified the following containment post-accident hydrogen control system component types that are within the scope of license renewal and subject to an AMR: detection chambers; fan/blower housings; flexible hoses; flow elements; flow orifices; hydrogen recombiner housings; pipe; tubing; and valves.

2.3A.3.19.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.19 and Millstone FSAR Section 6.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.19.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment post-accident hydrogen control system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment post-accident hydrogen control system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.20 Control Room Air Conditioning System

2.3A.3.20.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.20, the applicant described the control room air conditioning system. The control room air conditioning system functions to maintain a suitable environment for personnel and for safety-related control and electrical equipment during normal and accident operations. The control room air conditioning system consists of two full-capacity, independent air-handling and mechanical refrigeration systems. The system contains fire dampers to prevent the spread of fire.

The control room air conditioning system provides heat removal from the control room envelope for equipment cooling and personnel habitability, provides radiological control of the control room envelope for personnel habitability in the event of an accident, and provides RG 1.97

safety-related indications. The control room air conditioning system also supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.3.3-19, the applicant identified the following control room air conditioning system component types that are within the scope of license renewal and subject to an AMR: control room air handling units, control room filter banks, compressor casings; damper housings; ductwork; ductwork joint seals; fan/blower housings; filter dryer; moisture indicators; mufflers; pipe; tubing; and valves.

2.3A.3.20.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.20 and Millstone FSAR Sections 9.9.10, 14.8.4.1 and 14.8.4.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.20 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

For the control room air conditioning system, described on LRA drawing 25203-LR26027, sheet 3, at C-4 and D-4, items X-42A and X-42B include cooling coils but no heating coils. Neither cooling nor heating coils are included in Table 2.3.3-19. In RAI SPSB-1, the applicant was requested to clarify whether these heating and cooling coils and the associated housings are within the scope of license renewal in accordance with 10 CFR 54.4(a), and subject to aging management review in accordance with 10 CFR 54.21(a)(1). If they are, they should be included in Table 2.3.3-19.

In a response dated November 9, 2004, the applicant stated that items X-42A and X-42B on license renewal drawing 25203-LR26207, sheet 3, at C-4 and D-4 were the control room air conditioning system, air-handling units cooling coils. The air-handling units are not equipped with heating coils. The applicant further stated that cooling coil performs a pressure boundary intended function and is included in the component type "Control Room Air Handling Units" in LRA Table 2.3.3-19. The housing and coil are evaluated separately in LRA Table 3.3.2-19 as

"Control Room Air Handling Units (Housing)" and "Control Room Air Handling Units (Coils)." The staff finds this acceptable.

2.3A.3.20.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and the RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the control room air conditioning system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the control room air conditioning system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.21 Control Element Drive Mechanism Cooling System

2.3A.3.21.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.21, the applicant described the control element drive mechanism cooling system. The control element drive mechanism (CEDM) cooling system consists of three fan-coil units that draw containment air across finned-tube cooling coils and supply the cooled air to the CEDM shroud. The cooling coils are cooled by the reactor building closed cooling water system. The control element drive mechanism cooling system provides a pressure boundary for the reactor building closed cooling water system.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-20, the applicant identified the CEDM cooling coils within the scope of license renewal and subject to an AMR.

2.3A.3.21.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.21 and Millstone FSAR Section 9.9.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.21.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the CEDM cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the CEDM cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.22 Diesel Generator Ventilation System

2.3A.3.22.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.22, the applicant described the diesel generator ventilation system. The diesel generator ventilation system maintains a suitable environment for equipment and personnel during emergency diesel generator operation. The diesel generator ventilation system consists of a direct drive, in-line, vane-axial fan for each diesel generator room. The system contains fire dampers to prevent the spread of fire.

The diesel generator ventilation system provides heat removal to maintain a suitable environment for the operation of the emergency diesel generators. The diesel generator ventilation system contains NSR components used to mitigate the effects of a high-energy line break (HELB). The diesel generator ventilation system also supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-21, the applicant identified the following diesel generator ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; fan/blower housings; and flex connections.

2.3A.3.22.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.22 and Millstone FSAR Section 9.9.11. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.22.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the diesel generator ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the diesel generator ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.23 ESF Room Air Recirculation System

2.3A.3.23.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.23, the applicant described the ESF room air recirculation system. The ESF room air recirculation system functions to maintain a suitable environment for operation of the safety injection and containment spray pumps. The ESF room air recirculation system consists of two redundant, independent subsystems, each capable of maintaining the required temperature in their associated ESF pump room. Each ESF pump room contains one full capacity ESF room air recirculation system fan and cooling coil. The third pump room is served by both fans and coil units. The system contains fire dampers to prevent the spread of fire.

The ESF room air recirculation system provides heat removal from the ESF room atmosphere for ESF equipment cooling. The ESF room air recirculation system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-22, the applicant identified the following ESF room air recirculation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; ESF room air recirculation unit cooling coils; ESF room air recirculation unit housings; fan/blower housings; flex connections; and pipe.

2.3A.3.23.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.23 and Millstone FSAR Section 9.9.7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then

reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.23.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the ESF room air recirculation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the ESF room air recirculation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.24 Enclosure Building Filtration System

2.3A.3.24.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.24, the applicant described the enclosure building filtration system. The functions of the enclosure building filtration system are to collect and process any radioactivity released to the enclosure building filtration region from the containment after a LOCA, or from the auxiliary building after a fuel handling accident in the spent fuel pool.

The enclosure building filtration region includes the region between the penetration rooms, the ESF equipment rooms, and the containment and the enclosure building. The system may be used in conjunction with the backup hydrogen purge to process containment air in order to reduce airborne activity, reduce hydrogen concentration, or reduce pressure in containment by either venting or purging the containment. The system exhausts to either the unit vent stack or the stack.

The enclosure building filtration system provides for the collection and filtration of radioactive effluents from the enclosure building filtration region or the spent fuel pool area during radiological events in order to maintain releases to the environment below 10 CFR 100 limits, provides a negative pressure in the enclosure building filtration region in the event of a LOCA or rod ejection accident, and provides a flowpath for backup hydrogen purge to the stack. The enclosure building filtration system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary
- provides filtration

In LRA Table 2.3.3-23, the applicant identified the following enclosure building filtration system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; enclosure building filtration filter bank housings; fan/blower housings; flex connections; flow elements; pipe; tubing; and valves.

2.3A.3.24.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.24 and Millstone FSAR Sections 5.2.1, 5.2.8.4.1, 5.3.4, 6.7, 9.9.5.4.1, 9.9.8.3.2, 9.9.10.2.1, and 14.8.4.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.24 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

For the enclosure building filtration system, described on LRA drawing 25203-LR26028, sheet 5, at J-10 and F-10; items X-61A and X-61B include heating and cooling coils that are not listed in LRA table 2.3.3-23. In RAI SPSB-2, dated June 25, 2004, the applicant was requested to clarify whether these heating and cooling coils and the associated housings are within the scope of license renewal in accordance with 10 CFR 54.4(a), and subject to aging management review in accordance with 10 CFR 54.21(a)(1). If they are excluded from the scope of license renewal and not subject to an AMR, provide justification for the exclusion.

In a response dated November 9, 2004, the applicant stated that items X-61A and X-61B shown on license renewal drawing 25203-LR26028, sheet 5, at J10 and F-10 are the enclosure building filtration system filter bank dehumidifier heaters. There are no cooling coils associated with these filter banks. The electric dehumidifier heaters are designed to maintain the relative humidity of the air stream entering the charcoal filters at less than 90 percent. As stated in FSAR Section 6.7.2.1, an analysis has been performed that shows the relative humidity of the entering air stream will remain less than 90 percent regardless of heater operation. Therefore, the applicant concluded that the dehumidifier electric heaters are not within the scope of license renewal. The housings associated with the filter banks are within the scope of license renewal and are identified as “Enclosure Building Filtration Filter Bank Housing” in LRA Table 2.3.3-23. The staff finds this acceptable.

On the basis of its review and resolution of RAI SPSB-2, the staff found that the applicant has identified those portions of the enclosure building filtration system that meet the scoping requirements of 10 CFR 54.4 and has included them within the scope of license renewal in LRA Section 2.3.3.24. The applicant has also included enclosure building filtration system components that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1) in LRA Table 2.3.3-23 “Enclosure Building Filtration.”

2.3A.3.24.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the enclosure building filtration system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the enclosure building filtration system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.25 Fuel Handling Area Ventilation System

2.3A 3.25.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.25, the applicant described the fuel handling area ventilation system. The fuel handling area ventilation system provides a suitable environment for equipment and fresh air ventilation for personnel within the fuel handling area of the auxiliary building, while preventing cross-contamination with surrounding areas. The fuel handling area ventilation system is balanced to maintain a negative pressure in the area. Before irradiated fuel is handled, the fuel handling area ventilation system exhaust air is diverted through the enclosure building filtration system. In the event of a fuel handling accident, the enclosure building filtration system processes the fuel handling area exhaust to ensure that accident doses at the site boundary are well below 10 CFR 100 guidelines. The fuel handling area ventilation system also contains fire dampers to prevent the spread of fire.

The fuel handling area ventilation system provides an enclosure building filtration system flow path from the fuel handling area in the event of a fuel handling accident. The fuel handling area ventilation system also contains components that support fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-24, the applicant identified the following fuel handling area ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; ductwork joint seals; flow elements; pipe; and valves.

2.3A.3.25.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.25 and Millstone FSAR Section 9.9.8. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.25.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the fuel handling area ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the fuel handling area ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.26 Main Exhaust Ventilation System

2.3A.3.26.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.26, the applicant described the main exhaust ventilation system. The main exhaust ventilation system is designed to exhaust air from areas of the auxiliary building and provide a clean-up and exhaust flowpath for the containment and enclosure building purge system. The system contains fire dampers to prevent the spread of a fire.

The main exhaust ventilation system provides system isolation upon receipt of a containment isolation signal and RG 1.97 safety-related indications. The main exhaust ventilation system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-25, the applicant identified the following main exhaust ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; filter bank housing; pipe; tubing; and valves.

2.3A.3.26.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.26 and Millstone FSAR Section 9.9.9. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.26.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the main exhaust ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the main exhaust ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.27 Non-Radioactive Area Ventilation System

2.3A.3.27.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.27, the applicant described the non-radioactive area ventilation system. The non-radioactive area ventilation system provides a suitable environment for equipment and fresh air ventilation for personnel within the clean areas of the auxiliary building, including the east and west turbine building cable vaults and the battery rooms. The system contains fire dampers to prevent the spread of a fire.

The non-radioactive area ventilation system contains NSR components that are used to mitigate the effects of a HELB, and the system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The non-radioactive area ventilation system also supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.3.3-26, the applicant identified the following non-radioactive area ventilation system component types that are within the scope of license renewal and subject to an AMR: cable vault recirculation unit cooling coils; damper housings; ductwork; and fan/blower housings.

2.3A.3.27.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.27 and Millstone FSAR Section 9.9.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.27.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the non-radioactive area ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the non-radioactive area ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.28 Process and Area Radiation Monitoring System

2.3A.3.28.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.28, the applicant described the process and area radiation monitoring system. The process and area radiation monitoring system provides radioactivity monitoring for liquid and gaseous process fluids and plant areas. The system is designed to detect and measure radiation conditions in the plant for personnel protection and to prevent releases in excess of allowable limits.

The process and area radiation monitoring system provides a pressure boundary for interfacing systems, providing containment pressure boundary integrity, an actuation of certain systems or components in response to detected radiation conditions, and RG 1.97 safety-related indications. The process and area radiation monitoring system also contains environmental qualification equipment and supports station blackout.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-27, the applicant identified the following process and area radiation monitoring system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe; tubing; and valves.

2.3A.3.28.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.28 and Millstone FSAR Section 7.5.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.28 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In particular, LRA Section 2.3.3.28 states that this system is within the scope of license renewal because it meets the requirements of 10 CFR 54.4(a)(1) by providing "actuation of certain systems or components in response to detected radiation conditions." In order to perform this function, a section of piping connecting the radiation detectors to the system being monitored is required to serve as a pressure boundary. This section of piping was not shown on license renewal drawings for the process area and radiation monitoring systems as being within the scope of license renewal. In RAI 2.3.3.28-1A, dated June 9, 2004, the staff requested the applicant to explain how the system-level intended function is performed without this section of piping included within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

In its response, dated July 26, 2004, the applicant stated that this specific section of piping and components was omitted from inclusion within the scope of license renewal. The applicant stated that these components support the radiation monitor actuation function to secure containment purge flow in the event of a fuel handling accident within the containment and, therefore, are within the scope of license renewal. The applicant stated that it updated the process and area radiation monitoring system screening results and AMR results to include the additional component types.

The staff did not find the applicant's response to RAI 2.3.3.28-1A adequate because the updated LRA Table 2.3.3.27, including additional in-scope component types, was not provided in the July 26, 2004, RAI response for the staff to review. Therefore, during a teleconference between the staff and the applicant on November 1, 2004, the staff requested that the applicant provide the updated Table 2.3.3.27 with the information related to the added components in response to RAI 2.3.3.28-1A.

In its response dated December 3, 2004, the applicant stated that the necessary additions to the LRA table were included in a supplement to the application dated July 7, 2004, that included additions to Table 3.3.2-27. The added component types were the fan/blower housing, filter housings, and radiation detectors, with a pressure boundary intended function.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.28-1A acceptable because (1) the applicant agreed that the specific section of piping connecting the radiation detectors to the system being monitored, with its associated components, supports the radiation monitor actuation function to secure containment purge flow within the containment in the event of a fuel handling accident, and is within the scope of license renewal; and (2) the applicant adequately identified the component types that were added to the LRA table in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.28-1A is resolved.

2.3A.3.28.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and the RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the process and area radiation monitoring system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the process and area radiation monitoring system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.29 Radwaste Area Ventilation System

2.3A.3.29.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.29, the applicant described the radwaste area ventilation system. The radwaste area ventilation system provides a suitable environment for equipment and fresh air ventilation for personnel within the potentially radioactive areas of the auxiliary building. These areas are maintained at a slightly negative pressure and air flow is maintained in the direction of areas with potentially higher radioactivity. The system contains fire dampers to prevent the spread of a fire.

The radwaste area ventilation system isolates normal ventilation from the engineered safety features pump rooms on an enclosure building filtration system actuation signal. The radwaste area ventilation system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-28, the applicant identified the following radwaste area ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; and ductwork joint seals.

2.3A.3.29.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.29 and Millstone FSAR Section 9.9.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.29.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the radwaste area ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the radwaste area ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.30 Turbine Building Ventilation System

2.3A.3.30.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.30, the applicant described the turbine building ventilation system. The turbine building ventilation system provides a suitable environment for the equipment and personnel within the turbine building. The turbine building ventilation system contains fire dampers to prevent the spread of fire.

The turbine building ventilation system provides an automatic trip of the steam-driven auxiliary feedwater pump room exhaust fan in the event of a steam line break in the room. The turbine building ventilation system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-29, the applicant identified the following turbine building ventilation system component type that is within the scope of license renewal and subject to an AMR: damper housings.

2.3A.3.30.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.30 and Millstone FSAR Section 9.9.12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.30.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the turbine building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the turbine building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.31 Vital Switchgear Ventilation System

2.3A.3.31.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.31, the applicant described the vital switchgear ventilation system. The vital switchgear ventilation system functions to maintain a suitable environment for safety-related equipment during normal operation, loss of offsite power, and post-accident conditions. This system consists of independent subsystems, each capable of removing 100 percent of the heat generated in the associated vital electrical equipment room. The east and west vital DC switchgear rooms are provided with closed-cycle air subsystems utilizing mechanical refrigeration to maintain the ambient conditions within these areas. The motor control center (MCC) B51 and B61 enclosures are provided with self-contained air conditioning units. The 4160V switchgear rooms and east and west 480V switchgear rooms are cooled by water-to-air cooling units. The vital switchgear ventilation system contains fire dampers to prevent the spread of a fire.

The vital switchgear ventilation system provides cooling to maintain a suitable environment for the operation of safety-related electrical equipment. The vital switchgear ventilation system also contains environmental qualification equipment and supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

- provides a pressure boundary
- provides for heat transfer

In LRA Table 2.3.3-30, the applicant identified the following vital switchgear ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; DC switchgear (SWGR) air conditioning unit cooling coils; DC SWGR air conditioning unit housings; ductwork; ductwork joint seals; fan/blower housings; MCC air conditioning units; pipe; tubing; valves; vital SWGR cooling unit coils; vital SWGR cooling unit housings; west 480V LCR cooling unit coils; and west 480V LCR cooling unit housings.

2.3A.3.31.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.31 and Millstone FSAR Section 9.7.2, 9.9.15 and 9.9.17. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.31.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the vital switchgear ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the vital switchgear ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.32 Unit 2 Fire Protection System

2.3A.3.32.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.32, the applicant described the fire protection system. The MPS fire protection system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. This section addresses those portions of the fire protection system that are specifically designated as Unit 2 components. Since this is a shared system, this section is duplicated in the Millstone Unit 3 license renewal application.

The Unit 2 fire protection system provides containment pressure boundary integrity. The fire protection system also provides fire detection and suppression capability to protect safe shutdown or safety-related equipment, provides oil collection for the prevention of an oil fire around the reactor coolant pumps, supports station blackout, provides emergency lighting, and provides backup cooling water to the emergency diesel generators in response to a fire event.

Intended functions within the scope of license renewal include the following:

- provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint)
- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow
- provides a spray pattern

In LRA Table 2.3.3-31, the applicant provided the screening results for the fire protection system components, identifying those components that require aging management review. Similarly, LRA Table 2.4.2-25 provides the screening results for the miscellaneous structural commodities. Table 2.4.2-25 includes fire barrier penetration seals and fire doors.

In LRA Table 2.3.3.31, the applicant identified the following fire protection system component types that are within the scope of license renewal and subject to an AMR: drip pans; fire hydrants; flame arrestors; flex connections; flow indicators; flow orifices; nozzles; pipe; pumps; RCP oil collection tanks; retard chambers; sprinkler heads; strainers; tubing; valves; and water motor gongs.

2.3A.3.32.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.32 and Millstone FSAR Section 9.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.32 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The staff noted that virtually all fire protection subsystems, including those protecting NSR areas, were identified on the fire protection system piping and instrumentation diagrams as being within scope of license renewal. However, systems for Warehouse #9, the craft assembly building and the maintenance shop were indicated as not being within the scope of license renewal.

In RAI 2.3.3.32-2, the staff requested an explanation for why these structures were excluded from the scope of license renewal. In its response dated November 9, 2004, the applicant stated that the excluded systems are not part of the plant fire protection licensing basis. The staff finds the applicant’s response to RAI 2.3.3.32-2 acceptable because protection of these areas is not required by regulation. Therefore, the staff's concern described in RAI 2.3.3.32-2 is resolved.

Drawing 25203-LR26011, sheet 1 of 6, shows an automatic suppression system for STG governor housing and oil lines identified as a preaction type system, but does not show an air supply for system monitoring. The suppression system is indicated as being within the scope of license renewal. In RAI 2.3.3.32-3 the NRC requested that the applicant explain the omission of the air supply for this system from the scope of license renewal. (The air supply to other in-scope preaction suppression systems are included within scope of license renewal.)

In its response, dated November 9, 2004, the applicant stated that this preaction suppression system is not an air supervised system. Based on its review, the staff finds the applicant's response to RAI 2.3.3.32-3 is acceptable, because air supervision of this suppression system is not required by regulation. Therefore, the staff's concern described in RAI 2.3.3.32-3 is resolved.

In RAI 2.3.3.32-4, the NRC requested information on the applicant's program to ensure continued access to an adequate supply of Halon for the extended life of the plant and/or plans to convert or replace the systems when a supply is no longer available.

In its response dated November 9, 2004, the applicant noted that there is no established program credited for license renewal to ensure the continued access to an adequate supply of Halon for the gaseous suppression systems. The applicant noted that in the event that the supply of Halon becomes inadequate during the period of extended operation, appropriate actions would be initiated to maintain compliance with the fire protection licensing basis. Based on its review, the staff finds the applicant's response to RAI 2.3.3.32-4 is acceptable, because an established program to address a possible inadequate supply of Halon is not required by NRC regulation. The staff recommends that the applicant make provisions to ensure continuous protection for areas protected by Halon extinguishing systems. However, this issue is considered closed with respect to the license renewal application.

2.3A.3.32.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the MPS fire protection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the MPS fire protection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.33 Unit 3 Fire Protection System

2.3A.3.33.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.33, the applicant described the Unit 3 fire protection system. The MPS fire protection system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. This section addresses those portions of the fire protection system that are specifically designated as Unit 3 components. Since this is a shared system, this section is duplicated in the Millstone Unit 2 license renewal application.

The Unit 3 fire protection system provides containment pressure boundary integrity, RG 1.97 safety-related indications, and pressure relief for tornado protection in the cable spreading area. The Unit 3 fire protection system also provides fire detection and suppression capability to protect safe shutdown or safety-related equipment, provides oil collection for the prevention of an oil fire around the RCPs, supports station blackout, and contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides for heat transfer
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint).
- provides filtration
- provides a spray pattern
- restricts flow
- provides for vortex suppression

In LRA Table 2.3.3-32, the applicant provided the screening results for Unit 3 fire protection system components (shared with Unit 2), identifying those components that require an AMR. Similarly, LRA Table 2.4.2-8 provides the screening results for the Unit 3 fire pump house.

In LRA Table 2.3.3-32, the applicant identified the following Unit 3 fire protection system component types that are within the scope of license renewal and subject to an AMR: CO_2 storage tank; CO_2 tank cooling coils; coolant heat exchanger; damper housings; diesel fuel storage tank; drip pans; ductwork; exhaust silencer; expansion tank overflow container; fan/blower housings; filter/strainers; fire hydrants; fire protection RCP oil collection tanks; fire water storage tank; flame arrestors; flex connections; flexible hoses; flow switches; heater unit; hydropneumatic tank; instrument snubbers; level indicators; lube oil; nozzles; odorizers; oil mist recovery unit; oil reservoirs; pipe; pumps; restricting orifices; sprinkler heads; tubing; vacuum limiter; valves; vortex breaker assembly; water cooled exhaust manifold; water manifold; pipe; and valves.

2.3A.3.33.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.33 and Millstone FSAR Section 9.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.33 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The staff noted that while, in general, wall hydrants are included within scope of license renewal, the wall hydrant at elevation 24 feet 6 inches of the control building is not included within scope according to piping and instrumentation diagram No. 25212-LR26946, sheet 4. In RAI 2.3.3.33-1, the NRC requested the basis for not including this hydrant.

In its response, by letter dated November 9, 2004, the applicant noted that the wall hydrant in question was installed recently and is not permanently connected to a water supply. According to the applicant, the hydrant does not perform a license renewal function. Based on its review, the staff finds the applicant's response to RAI 2.3.3.33-1 is acceptable, because no protection function is claimed for the hydrant.

2.3A.3.33.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the Unit 3 fire protection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the Unit 3 fire protection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.34 Domestic Water System

2.3A.3.34.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.34, the applicant described the domestic water system. The purpose of the domestic water system is to provide potable water for various uses. The domestic water system is supplied by the public water system from the town of Waterford, CT.

The domestic water system provides control room envelope pressure-boundary integrity. The domestic water system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-33, the applicant identified the following domestic water system component types that are within the scope of license renewal and subject to an AMR: pipe; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the domestic water system. In its December 3, 2004, RAI response, the applicant identified the domestic water hot water tank component type that was added to the scope of the domestic water system.

2.3A.3.34.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.34 and Millstone FSAR Section 9.12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the Unit 3 fire protection system is acceptable.

2.3A.3.34.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the domestic water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the domestic water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.35 Diesel Generator System

2.3A.3.35.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.35, the applicant described the diesel generator system. The purpose of the diesel generator system is to provide a dependable onsite AC power source capable of automatically starting and supplying the loads necessary to safely shut down the plant and maintain it in a safe shutdown condition.

The diesel generator system provides a reliable source of emergency power for the required loads. The diesel generator system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The diesel generator system supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides for heat transfer
- provides a pressure boundary
- provides filtration
- restricts flow
- provides limited structural integrity

In LRA Table 2.3.3-34, the applicant identified the following diesel generator system component types that are within the scope of license renewal and subject to an AMR: after-filter housings; air cooling heat exchangers; air intercoolers; air start distributors; expansion joints; filter/strainers; flow orifices; governor hydraulic oil; jacket water expansion tanks; jacket water heat exchangers; level indicators; lube oil heat exchangers; lube oil heaters; oil pans; pipe; pumps; silencers; stand-by jacket coolant heaters; starting air tanks; tubing; turbochargers; and valves.

2.3A.3.35.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.35 and Millstone FSAR Section 8.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.35 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the diesel generator system shows that the governors are not subject to an AMR. Although the governor itself is an active component, its housing serves a pressure boundary intended function. The governor housing was not, however, listed in LRA Tables 2.3.3-34 or 3.3.2-34 as a component within the scope of license renewal. In RAI 2.3.3.35-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the diesel generator governor from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that, consistent with the industry guideline for implementing the requirements of 10 CFR 54 (NEI 95-10), the emergency diesel generators are considered active and do not meet the criteria of 10 CFR 54.21(a)(1)(i). Additionally, the emergency diesel generator is considered a "complex assembly." The governor actuator unit shown in the license renewal drawing is a component of the "complex assembly." Thus, the applicant concluded that the governor actuator, including the housing, falls within the scope of license renewal, but does not require an AMR since the governor is considered an active component.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.35-1A acceptable, because the staff agrees that the governors and their sub-components are "complex assemblies" and, although they meet the requirements of 10 CFR 54.4(a), they do not require an AMR in accordance with 10 CFR 54.21(a)(1). Therefore, the staff's concern set forth in RAI 2.3.3.35-1A is resolved.

The staff also noted that a license renewal drawing for the diesel generator system shows level glasses and sight glasses as being subject to an AMR. However, these components are not listed in LRA Table 2.3.3-34. These components provide a pressure boundary intended function. In RAI 2.3.3.35-2A, dated June 9, 2004, the staff requested the applicant to confirm that level glasses and sight glasses are included with the components listed in LRA Table 2.3.3-34.

In its response, dated July 26, 2004, the applicant stated that the subject level glasses and sight glasses shown on license renewal drawings for the diesel generator system are within the scope of license renewal and included in the component type, "Level Indicators," in LRA Table 2.3.3-34. Additionally, the applicant described the documentation used to describe the aging effects of glass and that no aging management for glass is required.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.35-2A acceptable. The applicant states that level glasses and sight glasses were considered part of the component type, "Level Indicators," in LRA Table 2.3.3-34. Further, the applicant describes the method for evaluating the aging effects of glass and its aging management. Although glass is passive and long-lived, it has no aging effects and is subject to an AMR in accordance with 10 CFR 54.21(a)(1). The staff's concern described in RAI 2.3.3.35-2A is resolved.

A license renewal drawing for the diesel generator system has unidentified components that are shown to be subject to an AMR. As such, the staff was not able to confirm whether LRA Table 2.3.3-34 is complete. In RAI 2.3.3.35-3A, dated June 9, 2004, the staff requested the applicant to define the unidentified components and to indicate where they are listed in Table 2.3.3-34.

In its response, dated July 26, 2004, the applicant stated that the unidentified components are the in-line pilot air filters in the diesel air start system. The applicant further stated that they are included in the component type, "Filter/strainers," in LRA Table 2.3.3-34 Diesel Generator.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.35-3A acceptable, because the air filters were identified. The staff concludes that the air filters were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.35-1A is resolved.

2.3A.3.35.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the diesel generator system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the diesel generator system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.36 Diesel Generator Fuel Oil System

2.3A.3.36.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.36, the applicant described the diesel generator fuel oil system. The diesel generator fuel oil system provides fuel oil to the diesel engine cylinders. The diesel generator fuel oil system includes fuel oil tanks, transfer pumps, strainers, piping, and valves.

The diesel generator fuel oil system provides adequate fuel oil to support the safety function of the diesel generators. The diesel generator fuel oil system contains an NSR fuel oil storage tank and transfer system and contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The diesel generator fuel oil system supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides filtration
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.3.3-35, the applicant identified the following diesel generator fuel oil system component types that are within the scope of license renewal and subject to an AMR: clean oil storage tanks; diesel fuel oil storage tank; diesel oil supply tanks; filter/strainers; flame arrestors; level indicators; pipe; pumps; tubing; and valves.

2.3A.3.36.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.36 and Millstone FSAR Section 8.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.36 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

During its review, the staff noted that a license renewal drawing shows flexible hoses that are within the diesel generator fuel oil system to be within the scope of license renewal and subject to an AMR. However, flexible hose was not included in LRA Table 2.3.3-35. In RAI 2.3.3.36-1A, dated June 9, 2004. The staff requested the applicant to explain whether flexible hoses were included with another component type or to explain their exclusion.

In its response, dated July 26, 2004, the applicant stated that flexible hoses are within the scope of license renewal, but have been determined to be short-lived components. As described in LRA Section 2.1.5.1, short-lived components are shown on the license renewal drawings. However, these short-lived components are not subject to an AMR and are not included in the screening results tables provided in Section 2 of the LRA. The applicant further stated that modified preventive maintenance program procedures will require the periodic replacement of the flexible hoses based on a specified time frequency.

The staff finds the applicant’s response to RAI 2.3.3.36-1A acceptable, because the flexible hoses will be replaced by preventive maintenance program procedures that have been modified such that the replacement is performed at a specified time frequency. Therefore, the flexible hoses in the diesel generator fuel oil system have been adequately evaluated in accordance with the criterion of 10 CFR 54.21(a)(1)(ii). The staff’s concern described in RAI 2.3.3.36-1A is resolved.

2.3A.3.36.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the diesel generator fuel oil system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the diesel generator fuel oil system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.37 Station Blackout Diesel Generator System

2.3A.3.37.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.37, the applicant described the station blackout (SBO) diesel generator system. The MPS SBO diesel generator system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared system, this section is duplicated in the Millstone Unit 3 license renewal application.

The SBO diesel generator system supports SBO and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow

In LRA Table 2.3.3-36, the applicant identified the following SBO diesel generator system component types that are within the scope of license renewal and subject to an AMR: aftercoolers; air receivers; aspirators; expansion joints; expansion tanks; filter/strainers; flame arrestors; flow indicators; fuel heaters; fuel oil day tanks; fuel oil storage tanks; immersion heaters; injectors; lube oil coolers; lubricators; oil sumps; pipe; pulsation dampeners; pumps; radiators; restricting orifices; silencers; tubing; turbo chargers; and valves.

2.3A.3.37.2 Staff Evaluation

The Millstone SBO diesel generator system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. The staff reviewed LRA Section 2.3.3.37, Millstone Unit 2 FSAR Section 1.2.9, and Millstone Unit 3 FSAR Section 8.3.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.37 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the station SBO generator system shows a 28-inch exhaust rain cap to be subject to an AMR. The rain cap appears to provide a pressure boundary. Unit 2 LRA Table 2.3.3-36 and Unit 3 LRA Table 2.3.3-41 do not list rain cap as a component type requiring an AMR. In RAI 2.3.3.37-1A, dated June 9, 2004, the staff requested the applicant to explain whether the rain cap was included with another component type or to explain its exclusion from the scope of license renewal.

In its response dated July 26, 2004, the applicant stated that the subject rain cap, shown on the SBO diesel generator system license renewal drawing, is an integral part of the exhaust silencer. The exhaust silencer with the integral rain cap is within the scope of license renewal and included in the component type, "Silencers," in Unit 2 LRA Table 2.3.3-36 and Unit 3 LRA Table 2.3.3-41.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.37-1A acceptable, because the rain cap was identified. The staff concludes that the rain cap was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.37-1A is resolved.

The Millstone Unit 3 FSAR states that all safety-related lines or valves, which are subject to freezing, are electrically heat-traced and insulated. A license renewal drawing for the SBO fuel oil system shows a line going from the fuel oil storage tank to the fuel oil day tank that is within the scope of license renewal. It appears that the line in question is insulated. Thermal insulation is not listed as within the scope of license renewal and subject to an AMR for any Unit 2 or Unit 3 systems, nor is it discussed in the Unit 2 or Unit 3 LRA. In RAI 2.3.3.37-2A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of pipe insulation from the scope of license renewal.

In its response dated July 26, 2004, the applicant stated that the subject fuel line is heat-traced and thermally insulated. This insulation does not perform an intended function since the effectiveness of the heat trace system on the fuel temperatures in the subject fuel line and fuel tank is monitored. In the event of low fuel temperatures, a heat-trace trouble alarm is activated in the control room. Insulation-related problems would be rapidly identified and repaired. Therefore, the applicant concluded that the thermal insulation is not within the scope of license renewal.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.37-2A acceptable based on operator actions to respond to a heat-trace trouble alarm and initiate the subsequent corrective actions. The ability of the system's temperature monitoring instrumentation to localize a low temperature along the length of the piping would allow differentiation between thermal insulation or heat-trace circuit problems. Therefore, the cause of the trouble alarm would be localized such that identification and appropriate repair would be made before loss of system-level intended function would occur. Therefore, the staff's concern described in RAI 2.3.3.37-2A is resolved.

2.3A.3.37.3 Conclusion

The staff reviewed the LRA and the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SBO diesel generator system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SBO diesel generator system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.38 Security System

2.3A.3.38.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.38, the applicant described the security system. The Millstone security system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared system, this section is duplicated in the Millstone Unit 3 license renewal application.

The security system provides yard lighting, and backup electrical power for yard lighting, in support of fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration

In LRA Table 2.3.3-37, the applicant identified the following security system component types that are within the scope of license renewal and subject to an AMR: coolers; diesel fuel oil storage tank; fan/blower housings; filter/strainers; heaters; oil pans; pipe; pumps; radiators; tubing; and valves.

2.3A.3.38.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.38. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.38.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the security system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the security system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.39 Clean Liquid Waste Processing System

2.3A.3.39.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.39, the applicant described the clean liquid waste processing system. The clean liquid waste processing system collects, stores, processes, recycles, and disposes of liquid radioactive waste.

The clean liquid waste processing system provides pressure boundary integrity and isolation for the containment and interfacing safety-related systems, and RG 1.97 safety-related indications. The clean liquid waste processing system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The clean liquid waste processing system also contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-38, the applicant identified the following clean liquid waste processing system component types that are within the scope of license renewal and subject to an AMR: degasifier after cooler; degasifier effluent cooler; degasifier preheater; flow elements; primary drain tank and quench tank cooler; pipe; primary drain tank; pumps; strainers; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the clean liquid waste processing system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the clean liquid waste processing system:

- conductivity element
- degasifiers
- degasifier vent condenser
- equipment drain sump tank
- flexible hose
- flow indicator

2.3A.3.39.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.39 and Millstone FSAR Section 11.1.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.39 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the clean liquid waste processing system shows that the license renewal system boundary extends to another drawing that was not provided in the LRA. The piping at this location is shown to extend to the pre-degasifier filter. Degasifier components are listed in LRA Table 2.3.3-38 as being within the scope of license renewal and subject to an AMR. In order for the staff to complete its review, more information was necessary to ensure that all the components performing the system-level intended functions were included within the scope of license renewal. In RAI 2.3.3.39-1A, dated June 9, 2004, the staff requested the applicant to supply the drawing that contains the remainder of the clean liquid waste processing system.

In its response, dated July 26, 2004, the applicant stated that the license renewal boundary of the clean liquid waste processing system does not extend to other drawings. The highlighted portion of the clean liquid waste processing system piping stops at a “T” junction before leaving its license renewal drawing. The applicant further stated that this is consistent with the drawing highlighting convention described in LRA Section 2.1.5.1 for identifying components for inclusion within the scope of license renewal for 10 CFR 54.4(a)(2). The "T" junction is an identifiable component on the drawing that is known to be outside the area of concern for spatially oriented NSR components near safety-related components.

The staff finds the applicant’s response to RAI 2.3.3.39-1A acceptable, because the applicant verified that all the components within the license renewal system evaluation boundary for the clean liquid waste processing system have been shown on its license renewal drawing. The staff concludes that all components of the clean liquid waste processing system were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.39-1A is resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant’s responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant’s December 3, 2004, response related to the scoping and screening results of the clean liquid waste processing system is acceptable.

2.3A.3.39.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the clean liquid waste processing system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the clean liquid waste processing system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.40 Gaseous Waste Processing System

2.3A.3.40.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.40, the applicant described the gaseous waste processing system. The gaseous waste processing system processes and controls the release of potentially radioactive waste gases.

The gaseous waste processing system provides pressure boundary integrity and isolation for the containment and interfacing safety-related systems, and provides RG 1.97 safety-related indications. The gaseous waste processing system also contains environmental qualification components.

Intended functions within the scope of license renewal include providing a pressure boundary.

In LRA Table 2.3.3-39, the applicant identified the following gaseous waste processing system component types that are within the scope of license renewal and subject to an AMR: aftercoolers; pipe; valves; and waste gas compressor seal coolers.

2.3A.3.40.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.40 and Millstone FSAR Section 11.1.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.3.40.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the gaseous waste processing system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the gaseous waste processing system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.41 Post-Accident Sampling System

2.3A.3.41.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.41, the applicant described the post-accident sampling system. The post-accident sampling system is designed to obtain samples of the reactor coolant, the containment sump fluid, and the containment atmosphere under accident conditions.

The post-accident sampling system provides the capability to obtain a post-accident sample of the containment atmosphere and the primary coolant. The post-accident sampling system contains NSR components essential for the operation of the system and components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity
- provides filtration

In LRA Table 2.3.3-40, the applicant identified the following post-accident sampling system component types that are within the scope of license renewal and subject to an AMR: accumulators; bolting; filter/strainers; flow elements; pumps; reservoir; sample chambers; tubing; and valves.

2.3A.3.41.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.41 and Millstone FSAR Section 9.6.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.41 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the post-accident sampling system shows pH probes, nitrogen gas bottles, nitrogen gas flasks, and other unidentified components shown as being within the scope of license renewal and subject to an AMR. The components do not appear as component types in LRA Table 2.3.3-40. Therefore the staff was not able to ensure that LRA Table 2.3.3-40 is complete. In RAI 2.3.3.41-1A, dated June 9, 2004, the staff requested the applicant to define where these components are included in LRA Table.

In its response, dated July 26, 2004, the applicant supplied a table that defined each of the unidentified components and stated where each was represented in the component types on LRA Table 2.3.3-40. The applicant further stated that the some of the components are penetration points and are included in the commodity group, “Panels and Cabinets,” in LRA Table 2.4.2-25. Additionally, the gas bottle has been determined to be a short-lived component.

The staff finds the applicant’s response to RAI 2.3.3.41-1A acceptable, because the unidentified components were adequately identified and shown where they appeared in LRA tables for screening results as applicable. The staff concludes that the post-accident sampling system components in question were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.41-1A is resolved.

Another license renewal drawing for the post-accident sampling system depicts temperature measuring components. Sensing devices connected to these instruments denote either a thermowell or a resistance bulb and head suitable for use with a secondary instrument, indicating that the instruments form part of the pressure boundary for the post-accident sampling system. In RAI 2.3.3.41-2A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the pressure retaining components from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that one type of temperature measuring components in question is a surface-mounted temperature detector that does not penetrate the system pressure boundary and is therefore not within the scope of license renewal. However, another type of temperature measuring component is installed in a tubing tee-fitting which does provide a pressure boundary function and is therefore within the scope of license renewal. The applicant further stated that tubing fittings are represented by the component type, "Tubing," in LRA Table 2.3.3-40.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.41-2A acceptable, because the applicant adequately identified the types of temperature measuring components in the post-accident sampling system and specified how they were represented in LRA Table 2.3.3-40. The staff concludes that the post-accident sampling system temperature measuring components were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.41-2A is resolved.

2.3A.3.41.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the post-accident sampling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the post-accident sampling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.42 Station Sumps and Drains System

2.3A.3.42.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.42, the applicant described the station sumps and drains system. The station sumps and drains system removes wastewater from various buildings and locations via floor drains, drain headers, and sump tanks. The system collects both radioactive and non-radioactive waste water and discharges directly to either the liquid waste system or to the yard drainage system.

The station sumps and drains system provides containment pressure boundary integrity, isolation between the emergency diesel generator rooms, and RG 1.97 safety-related indications. The station sumps and drains system provides both flood protection for safety-related areas and provides loop seals to maintain ventilation zone separation. The system also contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The station sumps and drains system contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides a protective barrier for internal/external flooding events

In LRA Table 2.3.3-41, the applicant identified the following station sumps and drains system component types that are within the scope of license renewal and subject to an AMR: pipe; pumps; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the station sumps and drains system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the station sumps and drains system:

- collection section tank
- flow indicators
- filter

2.3A.3.42.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.42. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the aerated liquid radwaste system is acceptable.

2.3A.3.42.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the station sumps and drains system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the station sumps and drains system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.43 Aerated Liquid Radwaste System

2.3A.3.43.1 Summary of Technical Information in the Application

The aerated liquid radwaste system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the aerated liquid radwaste system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

The applicant stated that the aerated liquid radwaste system provides controlled handling, processing, monitoring, and disposal of low-level radioactive liquids that are collected by open drains in the plant. It is a non-safety, low-energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system. Additional details of the aerated liquid radwaste system can be found in FSAR Section 11.1.3.

In accordance with the revised scoping methodology, the applicant identified the following component types for the aerated liquid radwaste system as being within the scope of license renewal and subject to an AMR:

- conductivity element
- flow elements
- flow indicators
- pipe
- pumps
- tubing
- valves

2.3A.3.43.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, response along with the clarifications added in the December 3, 2004, response for the aerated liquid radwaste system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions for the aerated liquid radwaste system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.3.43.3 Conclusion

Based on its review of the RAI responses, FSAR Section 11.1.3, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the aerated liquid radwaste system. Therefore, the staff concludes that the applicant adequately identified the aerated liquid radwaste system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the aerated liquid radwaste system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.44 Solid Waste Processing System

2.3A.3.44.1 Summary of Technical Information in the Application

The solid waste processing system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the solid waste processing system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

In its December 3, 2004, RAI response, the applicant stated that the solid waste processing system provides controlled handling, processing, monitoring, and packaging of radioactive-spent resins, from demineralizers and ion exchangers, and radioactive filter cartridges generated during plant operation. The system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SCC. Additional details of the solid waste processing system can be found in FSAR Section 11.1.5.

In accordance with the revised scoping methodology, the applicant identified the following component types for the solid waste processing system as being within the scope of license renewal and subject to an AMR:

- flow indicators

- pipe
- pumps
- spent resin fill head tank
- tubing
- valves

2.3A.3.44.2 Staff Evaluation

The staff reviewed the information that the applicant provided in its RAI responses dated November 9, 2004, and December 3, 2004, for the solid waste processing system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions for the solid waste processing system in accordance with the requirements of 10 CFR 54.4(a), to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.3.44.3 Conclusion

Based on its review of the information that the applicant provided in the responses dated November 9, 2004, and December 3, 2004, FSAR Section 11.1.5, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the solid waste processing system. Therefore, the staff concludes that the applicant adequately identified the solid waste processing system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the solid waste processing system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.45 Turbine Building Closed Cooling Water System

2.3A.3.45.1 Summary of Technical Information in the Application

The turbine building closed cooling water system (TBCCW) is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the TBCCW that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

The applicant stated that the TBCCW system is a closed-loop cooling water system that transfers heat from NSR turbine plant components and sample coolers to the SW system, via the TBCCW heat exchangers. The system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SCC. Additional details of the TBCCW system can be found in FSAR Section 9.7.3.

In accordance with the revised scoping methodology, the applicant in Attachment 1 identified the following component types for the TBCCW system as being within the scope of license renewal and subject to an AMR:

- chemical addition tank
- chiller condensers tubes
- exciter air coolers tubes
- flexible hoses
- flow elements
- flow indicators
- flow orifices
- pipe
- TBCCW pumps
- spent fuel pool area supplemental cooling heat exchangers tubes
- TBCCW heat exchangers channel heads
- TBCCW heat exchangers shell
- TBCCW heat exchangers tubes
- TBCCW heat exchangers tubesheet
- tubing
- valves

2.3A.3.45.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, and December 3, 2004, RAI responses for the TBCCW system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions for the TBCCW water system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.3.45.3 Conclusion

Based on its review of the information that the applicant provided in the responses dated November 9, 2004, and December 3, 2004, FSAR Section 9.7.3, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the TBCCW system. Therefore, the staff concludes that the applicant adequately identified the TBCCW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the TBCCW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.3.46 Water Box Priming System

2.3A.3.46.1 Summary of Technical Information in the Application

The water box priming system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the water box priming system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

The applicant stated that the water box priming system provides a vacuum source for priming the condenser water boxes in order to keep the condenser tubes full of water. The system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SCC.

In accordance with the revised scoping methodology, the applicant identified the following component types for the water box priming system as being within the scope of license renewal and subject to an AMR:

- filters/strainers
- flow orifices
- flow switches
- pipe
- valves

2.3A.3.46.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, and December 3, 2004, RAI responses for the water box priming system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9, 2004, RAI response, along with the clarifications added in the December 3, 2004, RAI response for the water box priming system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.3.46.3 Conclusion

During its review of the information that the applicant provided in the responses dated November 9, 2004, and December 3, 2004, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the water box priming system. Therefore, the staff concludes that the applicant adequately identified the water box priming system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the water box priming system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4 Steam and Power Conversion Systems

In LRA Section 2.3.4, the applicant identified the components of the steam and power conversion systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the steam and power conversion systems in the following sections of the LRA:

- 2.3.4.1 main steam system
- 2.3.4.2 extraction steam system
- 2.3.4.3 feedwater system
- 2.3.4.4 condensate system
- 2.3.4.5 condensate storage and transfer system
- 2.3.4.6 condensate demin mixed bed system
- 2.3.4.7 auxiliary feedwater system
- 2.3.4.8 feedwater heater vents and drains system
- 2.3.4.9 moisture separation and reheat system
- 2.3.4.10 plant heating and condensate recovery system
- 2.3.4.11 secondary chemical feed system
- 2.3.4.12 turbine gland sealing system

The corresponding subsections of this SER (2.3A.4.1 - 2.3A.4.12, respectively) present the staff's related review findings.

2.3A.4.1 Main Steam System

2.3A.4.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.1, the applicant described the main steam system. The main steam system transports steam from the steam generators to the turbine-generator. This system also provides a means of controlled heat release from the nuclear steam supply system during periods of station electrical load rejection or when the condenser is not available. The system provides steam for various auxiliary services including the steam generator auxiliary feedwater pump turbine, turbine gland sealing, and auxiliary steam.

The main steam system provides a steam flow path to remove heat from the reactor coolant system (RCS), overpressure protection for the steam generators, steam to the steam generator auxiliary feedwater pump turbine, isolation at system interfaces, containment pressure boundary integrity, and RG 1.97 safety-related indications. The main steam system also prevents uncontrolled blowdown of more than one steam generator following a main steam line break (MSLB), limits the maximum steam flow rate from a faulted steam generator, and provides steam generator isolation. The main steam system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC and NSR components credited for mitigating a HELB outside containment. The system also provides environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity
- provides structural and/or functional support related to mechanical components
- provides filtration

In LRA Table 2.3.4-1, the applicant identified the following main steam system component types that are within the scope of license renewal and subject to an AMR: condensing pots; expansion joints; flexible hoses; flow elements; flow orifices; moisture separators/reheaters; pipe; quench tank heat exchangers; silencers; steam traps; strainers; tubing; turbine casings; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the main steam system. In its December 3, 2004, RAI response, the applicant identified the steam generator blowdown tank component type that was added to the scope of the main steam system.

2.3A.4.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.1 and Millstone FSAR Sections 7.2.3, 7.5.6, 10.3, 10.4.5, 10.4.6, and 14.0. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the main steam system is acceptable.

2.3A.4.1.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the main steam system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the main steam system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.2 Extraction Steam System

2.3A.4.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.2, the applicant described the extraction steam system. The extraction steam system provides steam from the main steam system to the feedwater heaters to improve plant efficiency.

The extraction steam system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-2, the applicant identified the following extraction steam system component types that are within the scope of license renewal and subject to an AMR: expansion joints; pipe; steam traps; strainers; tubing; and valves.

2.3A.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.2 and Millstone FSAR Sections 10.1 and 10.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.2.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the extraction steam system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the extraction steam system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.3 Feedwater System

2.3A.4.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.3, the applicant described the feedwater system. The feedwater system heats and supplies condensate-quality water to the secondary-side of the steam generators to support heat removal from the RCS. A portion of the system provides the flowpath for auxiliary feedwater flow to the steam generators.

The feedwater system provides a flow path for auxiliary feedwater to the steam generators, containment pressure boundary integrity, and RG 1.97 safety-related indications. The feedwater system provides isolation of feed flow in the response to an MSLB and the system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also contains NSR components credited with mitigating the effects of a HELB. The system contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.4-3, the applicant identified the following feedwater system component types that are within the scope of license renewal and subject to an AMR: flow elements; flow orifices; heaters; pipe; pumps; tubing; and valves.

2.3A.4.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.3 and Millstone FSAR Sections 10.1, 10.4, and 14.8.2.1.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.3.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.4 Condensate System

2.3A.4.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.4, the applicant described the condensate system. The condensate system provides condensate flow from the main condenser to the suction of the feedwater pumps and provides feedwater heating to improve plant efficiency.

The condensate system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-4, the applicant identified the following condensate system component types that are within the scope of license renewal and subject to an AMR: condensers; drains coolers; expansion joints; flow elements; flow orifices; heat exchanger steam jet air ejectors; heaters; pipe; pumps; steam packing exhauster; tubing; and valves.

2.3A.4.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.4 and Millstone FSAR Sections 10.1, 10.4, and 14.8.2.1.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.4.4 identified areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the condensate system shows low-pressure main turbine exhaust hoods and the main condensers into which they exhaust as within the scope of license renewal and subject to an AMR. However, LRA Table 2.3.4-4 did not list exhaust hoods as a component type subject to an AMR. In RAI 2.3.4.4-1A, dated June 9, 2004, the staff requested the applicant to confirm that the low-pressure main turbine exhaust hoods are included with the components listed in LRA Table 2.3.4-4.

In its response, dated July 26, 2004, the applicant stated that the low-pressure main turbine exhaust hoods shown on the license renewal drawing for the condensate system are included in the component type, "Condensers," in LRA Table 2.3.4-4.

The staff finds the applicant's response to RAI 2.3.4.4-1A acceptable, because the low-pressure main turbine exhaust hoods were considered part of the component type, "Condensers," in LRA Table 2.3.4-4. The staff concludes that the low-pressure main turbine exhaust hoods in the condensate system were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.4.4-1A is resolved.

Another license renewal drawing for the condensate system shows an analysis sample nozzle as within the scope of license renewal and subject to an AMR. However, this component was not listed in LRA Table 2.3.4-4 as a component type requiring an AMR. In RAI 2.3.4.4-2A, dated June 9, 2004, the staff requested the applicant to confirm that the analysis sample nozzle is included with the components listed in LRA Section 2.3.4-4.

In its response, dated July 26, 2004, the applicant stated that the analysis sample nozzle shown on license renewal drawing 25203-LR26005, sheet 1 (location B-9), for the condensate system is included in the component type, "Pipe," in LRA Table 2.3.4-4.

The staff finds the applicant's response to RAI 2.3.4.4-2A acceptable, because the analysis sample nozzle was considered part of the component type, "Pipe," in LRA Table 2.3.4-4. The staff concludes that the analysis sample nozzle in the condensate system was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.4.4-2A is resolved.

Another license renewal drawing for the condensate system shows a water trough as within the scope of license renewal and subject to an AMR. However, this component was not listed in LRA Table 2.3.4-4 as a component type requiring an AMR. In RAI 2.3.4.4-3A, dated June 9, 2004, the staff requested the applicant to confirm that the "water trough" is included with the components listed in LRA Table 2.3.4-4.

In its response, dated July 26, 2004, the applicant stated that the water trough shown on the license renewal drawing for the condensate system was inadvertently highlighted and is not within the scope of license renewal. Therefore, it is not listed in LRA Table 2.3.4-4.

Based on its review, the staff finds the applicant's response to RAI 2.3.4.4-3A acceptable, because the water trough was highlighted in error and is not within the scope of license renewal and therefore does not need to appear in LRA Table 2.3.4-4. Therefore, the staff's concern described in RAI 2.3.4.4-3A is resolved.

2.3A.4.4.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the condensate system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the condensate system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.5 Condensate Storage and Transfer System

2.3A.4.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.5, the applicant described the condensate storage and transfer system. The condensate storage and transfer system provides the missile-protected water source for the auxiliary feedwater pumps.

The condensate storage and transfer system provides a protected water source for the auxiliary feedwater pumps and RG 1.97 safety-related indications. The condensate storage and transfer system contains NSR components credited with mitigating the effects of a HELB. The system supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow

In LRA Table 2.3.4-5, the applicant identified the following condensate storage and transfer system component types that are within the scope of license renewal and subject to an AMR: condensate storage tank; pipe; rupture disks; siphon breaker; tubing; and valves.

2.3A.4.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.5 and Millstone FSAR Sections 10.1 and 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.4.5 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The FSAR states that the condensate storage tank is equipped with a recirculation heating subsystem to prevent freezing within the tank during cold weather. The components of this subsystem located outside the tank were shown to be outside the scope of license renewal in a license renewal drawing for the condensate storage and transfer system. The condensate storage tank is within the scope of license renewal because it provides a protected water source for the auxiliary feedwater pumps. Since the presence of ice in the condensate storage tank has the potential of hampering flow to the auxiliary feedwater pumps, the recirculation heating subsystem should be within the scope of license renewal. In RAI 2.3.4.5-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the recirculation heating subsystem components located outside the condensate storage tank from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that although the condensate storage tank is provided with a recirculation heating subsystem, the installed low-temperature alarm and associated actions initiated in response to the alarm, together with the thermal inertia associated with such a large tank, provide assurance that freezing of the tank contents will not occur. Therefore, the applicant stated that the condensate storage tank recirculation heating subsystem is not required for the tank to perform its intended function and it is not within the scope of license renewal.

The staff finds the applicant's response to RAI 2.3.4.5-1A acceptable, because the applicant's explanation of the condensate storage tank low-temperature alarm and associated actions to ensure that condensate storage tank contents not freeze was adequate. Therefore, the staff agrees that the recirculation heating subsystem is not within the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.4.5-1A is resolved.

The FSAR states that the condensate storage tank discharges are protected by screens that will prevent the blockage of flow to the auxiliary feedwater pumps in the event of a postulated free-falling fragment caused by a missile impacting the tank. However, the license renewal drawing for the condensate storage and transfer system does not show the existence of screens at the two condensate storage tank discharges, nor did LRA Table 2.3.4.5 include screens as a component type subject to an AMR. These screens should be within the scope of license renewal because they ensure unrestricted flow to the auxiliary feedwater pumps. In RAI 2.3.4.5-2A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the screens located at the discharge piping in the condensate storage tank from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the internal screens described in the FSAR are within the scope of license renewal. The screens were evaluated as an integral part of the condensate storage tank and are not listed separately in LRA Table 2.3.4.5.

The staff finds the applicant's response to RAI 2.3.4.5-2A acceptable, because the applicant's explanation that the condensate storage tank discharge screens were within the scope of license renewal and subject to an AMR was adequate. Therefore, the staff's concern described in RAI 2.3.4.5-2A is resolved.

In its review, the staff noted that the license renewal drawing for the condensate storage and transfer system shows a series of 1-inch pipes located inside the condensate storage tank. The piping is shown outside the scope of license renewal. However it is part of the nitrogen sparger system used to lower the oxygen concentration in the tank. A potential failure and possible fragmentation of this piping could introduce a source of flow blockage to the auxiliary feedwater pumps and therefore should be within the scope of license renewal and subject to an AMR. In RAI 2.3.4.5-3A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the nitrogen sparger piping located inside the condensate storage tank from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the nitrogen sparger lines internal to the condensate storage tank are not within the scope of license renewal. The screens that are within the scope of license renewal are installed to protect the tank discharge piping leading to the auxiliary feedwater pumps. Therefore, the applicant stated that failure of the internal nitrogen piping will not impede the operation of the auxiliary feedwater pumps.

The staff finds the applicant's response to RAI 2.3.4.5-3A acceptable, because the applicant's explanation that the condensate storage tank discharge screens that are within the scope of license renewal protect the auxiliary feedwater pump suction from debris, including that caused by failure of nitrogen sparger piping, was adequate. Therefore, the staff's concern described in RAI 2.3.4.5-3A is resolved.

2.3A.4.5.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the condensate storage and transfer system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the condensate storage and transfer system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.6 Condensate Demin Mixed Bed System

2.3A.4.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.6, the applicant described the condensate demin mixed bed system. The condensate demin mixed bed system is used to maintain secondary system water chemistry.

The condensate demin mixed bed system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-6, the applicant identified the following condensate demin mixed bed system component types that are within the scope of license renewal and subject to an AMR: pipe; tubing; and valves.

2.3A.4.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.6 and Millstone FSAR Sections 10.1 and 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.6.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the condensate demin mixed bed system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the condensate demin mixed bed system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.7 Auxiliary Feedwater System

2.3A.4.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.7, the applicant described the auxiliary feedwater system. The auxiliary feedwater system provides a supply of feedwater to the secondary-side of the steam generators for RCS heat removal if normal feedwater flow is unavailable. The system consists of two motor-driven pumps powered from the emergency busses, and a steam turbine-driven pump that provides feedwater flow upon a loss of all AC power. The normal source of water to the auxiliary feedwater pumps is the condensate storage tank in the condensate storage and transfer system. The fire protection system can provide an alternate source of water to the pumps.

The auxiliary feedwater system provides feedwater to the steam generators for removal of sensible and decay heat from the RCS, isolation of auxiliary feedwater flow to a faulted or ruptured steam generator, auxiliary feedwater flow limitation to prevent pump runout, and RG

1.97 safety-related indications. The auxiliary feedwater system contains NSR components that mitigate the effects of a HELB outside containment. The system provides environmental qualification components and supports fire protection, anticipated transient without scram, and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow

In LRA Table 2.3.4-7, the applicant identified the following auxiliary feedwater system component types that are within the scope of license renewal and subject to an AMR: flow elements; flow orifices; pipe; pumps; tubing; turbine casings; and valves.

2.3A.4.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.7 and Millstone FSAR Sections 7.9 and 10.4.5 The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.7.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the auxiliary feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the auxiliary feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.8 Feedwater Heater Vents and Drains System

2.3A.4.8.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.8, the applicant described the feedwater heater vents and drains system. The feedwater heater vents and drains system collects condensed extraction steam drains and provides a flowpath to the condenser for steam vents from the shell-side of the feedwater heaters.

The feedwater heater vents and drains system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-8, the applicant identified the following feedwater heater vents and drains system component types that are within the scope of license renewal and subject to an AMR: condensing pots; expansion joints; flow elements; flow orifices; gland seal coolers; heater drains tank; level indicators; pipe; pumps; restricting orifices; tubing; and valves.

2.3A.4.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.8 and Millstone FSAR Sections 10.1 and 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.8.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the feedwater heater vents and drains system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the feedwater heater vents and drains system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.9 Moisture Separation and Reheat System

2.3A.4.9.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.9, the applicant described the moisture separation and reheat system. The moisture separation and reheat system removes entrained moisture from the high-pressure turbine exhaust steam and provides superheated steam to the low-pressure turbine inlets.

The moisture separation and reheat system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-9, the applicant identified the following moisture separation and reheat system component types that are within the scope of license renewal and subject to an AMR: condensing pots; drain pots; drain tanks; flow elements; pipe; tubing; and valves.

2.3A.4.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.9 and Millstone FSAR Sections 10.1, 10.2, and 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.9.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the moisture separation and reheat system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the moisture separation and reheat system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.10 Plant Heating and Condensate Recovery System

2.3A.4.10.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.10, the applicant described the plant heating and condensate recovery system. The plant heating and condensate recovery system provides low-pressure steam for various plant loads and collects the condensed steam drains for reprocessing.

The plant heating and condensate recovery system provides detection and isolation of a HELB in the steam portion of the system and provides a pressure boundary for the reactor building closed cooling water system. The plant heating and condensate recovery system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification components and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-10, the applicant identified the following plant heating and condensate recovery system component types that are within the scope of license renewal and subject to an AMR: heating and ventilation units; heating coils; pipe; reservoir; sample coolers; steam traps; strainers; tubing; and valves.

2.3A.4.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.10 and Millstone FSAR Section 9.13.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.4.10 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the plant heating and condensate recovery system does not show the refueling water storage tank (RWST) heat exchanger and attached piping as part of the evaluation boundary. A potential leak in this heat exchanger or the attached piping inside of the RWST could potentially reduce the boron concentration in the tank and thereby impact the safe shutdown boric acid requirements. Therefore, the staff concluded that this heat exchanger and the attached piping inside of the RWST has a passive pressure boundary function. In RAI 2.3.4.10-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the RWST heating system from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the RWST fluid temperature is maintained within requirements by the subject heat exchanger. RWST fluid is on the tube-side of the heat exchanger and heating is provided by plant auxiliary steam on the shell-side. The normal pressure of the shell-side of the heat exchanger is less than that of the RWST fluid on the tube-side such that any tube leakage would be expected to be from the tubes into the shell. Operating experience with past heat exchanger tube leakage confirms that leakage has been from the tube-side to the shell-side of the heat exchanger. In the event that steam pressure were to be higher than tube-side fluid pressure, the steam environment would result in limited leakage of liquid volume into the RWST such that significant dilution of the greater than 420,000-gallon volume of borated water in the tank would not be expected. In addition, drainage of the RWST below the minimum required volume, due to heat exchanger tube leakage, is prevented by a siphon breaker in the supply line internal to the tank. Therefore, the applicant concluded that since the failure of the RWST heat exchanger cannot have a significant effect on the boron concentration of its contents or the level of the tank, the heat exchanger was not included within the scope of license renewal for boron dilution concerns. In addition, the piping internal to the RWST and the siphon breaker are included within the scope of RWST and are subject to an AMR.

Based on its review, the staff finds the applicant's response to RAI 2.3.4.10-1A acceptable, because the applicant's explanation that the RWST heating system could not result in a dilution event or loss of inventory due to a piping failure was adequate. Further, the applicant explained that piping and the siphon breaker internal to the RWST are within the scope of license renewal and subject to an AMR. Therefore, the staff's concern described in RAI 2.3.4.10-1A is resolved.

2.3A.4.10.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the plant heating and condensate recovery system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the plant heating and condensate recovery system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.11 Secondary Chemical Feed System

2.3A.4.11.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.11, the applicant described the secondary chemical feed system. The secondary chemical feed system provides the capability to inject chemicals into the secondary cycle flowstream to maintain water chemistry within desired limits.

The secondary chemical feed system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-11, the applicant identified the following secondary chemical feed system component types that are within the scope of license renewal and subject to an AMR: tubing; and valves.

2.3A.4.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.11 and Millstone FSAR Section 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3A.4.11.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the secondary chemical feed system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the secondary chemical feed system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.12 Turbine Gland Sealing System

2.3A.4.12.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.12, the applicant described the turbine gland sealing system. The turbine gland sealing system provides low-pressure steam for sealing the turbine shaft casing penetrations and valve stem packing glands from air in-leakage or steam out-leakage.

The turbine gland sealing system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-12, the applicant identified the following turbine gland sealing system component types that are within the scope of license renewal and subject to an AMR: flow orifices; pipe; tubing; valves; and water pot.

2.3A.4.12.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.12 and Millstone FSAR Sections 10.2 and 10.4.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.4.12 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

Specifically, the staff noted that the license renewal drawing shows two plugs as not being within the scope of license renewal. The plugs are on the gland seal piping coming to the steam packing exhauster. The staff determined that the piping to which the plugs are attached is within the scope of renewal because it meets 10 CFR 54.4(a)(2). Failure of the plugs may have the same effect as failure of the piping. Therefore, in RAI 2.3.4.12-1A, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the plugs from the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the subject plugs on license renewal drawing are considered pipe fittings and are within the scope of license renewal, but were inadvertently not highlighted on the license renewal drawing. The applicant further stated the plugs are included in the component type, "Pipe," in LRA Table 2.3.4-12 and are therefore subject to an AMR.

The staff finds the applicant's response to RAI 2.3.4.12-1A acceptable, because the applicant explained that the plugs were within the scope of license renewal and are included in LRA Table 2.3.4-12. Therefore, the staff's concern described in RAI 2.3.4.12-1A is resolved.

2.3A.2.12.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the turbine gland sealing system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the turbine gland sealing system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.13 Auxiliary Steam Reboiler and Deaerating Feedwater System

2.3A.4.13.1 Summary of Technical Information in the Application

The auxiliary steam reboiler and deaerating feedwater system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the auxiliary steam reboiler and deaerating feedwater system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

In the December 3, 2004, RAI response, the applicant stated that the auxiliary steam reboiler and deaerating feedwater system provides a source of auxiliary steam for house heating loads. It is a non-safety, low-energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system and are attached to safety-related piping. Additional details of the auxiliary steam reboiler and deaerating feedwater system can be found in FSAR Section 10.3.1.1.

In accordance with the revised scoping methodology, the applicant identified the following component types for the auxiliary steam reboiler and deaerating feedwater system as falling within the scope of license renewal and subject to an AMR:

- auxiliary steam feedwater surge tank
- pipe
- sample coolers
- valves

2.3A.4.13.2 Staff Evaluation

The staff reviewed the information that the applicant provided its November 9, 2004, and December 3, 2004, RAI responses for the auxiliary steam reboiler and deaerating feedwater system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9, 2004, and December 3, 2004, submittals for the auxiliary steam reboiler and deaerating feedwater system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.4.13.3 Conclusion

Based on its review of the supplemental information that the applicant provided in its responses dated November 9, 2004, and December 3, 2004, FSAR Section 10.3.1.1, and licensing basis information; the staff did not identify any omissions or discrepancies in the applicant’s scoping and screening results for the components of the auxiliary steam reboiler and deaerating feedwater system. Therefore, the staff concludes that the applicant adequately identified the auxiliary steam reboiler and deaerating feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the auxiliary steam reboiler and deaerating feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.14 Exciter Air Cooler System

2.3A.4.14.1 Summary of Technical Information in the Application

The exciter air cooler system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the exciter air cooler system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal by response dated December 3, 2004.

In the December 3, 2004, RAI response, the applicant stated that the exciter air cooler system provides air cooling to the main generator exciter and isophase bus duct. Turbine building component cooling water serves as the heat sink for the system. Heat transfer occurs in the isolated phase bus cooler. It is a non-safety, low-energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system. Additional details of the exciter air cooler system can be found in FSAR Sections 9.7.3.2.1 and 10.2.

In accordance with the revised scoping methodology, the applicant identified the main transformer and generator isophase bus duct cooling exchangers coils as the one component type for the exciter air cooler system as being within the scope of license renewal and subject to an AMR.

2.3A.4.14.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, and December 3, 2004, RAI responses for the exciter air cooler system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9, 2004, and December 3, 2004, RAI responses for the exciter air cooler system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.4.14.3 Conclusion

Based on its review of the supplemental information that the applicant provided in the responses dated November 9, 2004, and December 3, 2004, FSAR Sections 9.7.3.2.1 and 10.2, and licensing basis information; the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the exciter air cooler system. Therefore, the staff concludes that the applicant adequately identified the exciter air cooler system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the exciter air cooler system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.15 Stator Liquid Cooler System

2.3A.4.15.1 Summary of Technical Information in the Application

The stator liquid cooler system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the stator liquid cooler system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal by response dated December 3, 2004.

In the December 3, 2004, response, the applicant stated that the stator liquid cooler system provides a source of cooling to the main generator stator. Turbine building component cooling water serves as the heat sink for the system. It is a non-safety, low-energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system. Additional details of the stator liquid cooler system can be found in FSAR Sections 9.7.3.2.1 and 10.2.

In accordance with the revised scoping methodology, the applicant, in its November 9, 2004, RAI response, identified the following component types for the stator liquid cooler system as being within the scope of license renewal and subject to an AMR:

- deionizer
- filter/strainers
- flow indicators
- flow orifices
- level indicators
- pipe
- pumps
- stator liquid coolers (channel head)
- stator liquid coolers (shell)
- stator liquid coolers (tube sheet)
- stator liquid cooling water storage tank
- tubing
- valves

2.3A.4.15.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, and December 3, 2004, responses for the stator liquid cooler system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9, 2004, and December 3, 2004, responses for the stator liquid cooler system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.4.15.3 Conclusion

Based on its review of the information that the applicant provided in its responses dated November 9, 2004, and December 3, 2004, FSAR Sections 9.7.3.2.1 and 10.2, and licensing basis information; the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the stator liquid cooler system. Therefore, the staff concludes that the applicant adequately identified the stator liquid cooler system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the stator liquid cooler system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.16 Turbine Lube Oil System

2.3A.4.16.1 Summary of Technical Information in the Application

The turbine lube oil system is an NSR system that was previously excluded from the scope of license renewal. As a result of the revised scoping methodology set forth in the applicant's November 9, 2004, RAI response, the applicant added portions of the turbine lube oil system that could spatially interact with safety-related SSCs. The applicant provided descriptions of the systems that were added to the scope of license renewal in response to RAI 2.1-1 in its December 3, 2004, RAI response.

In the December 3, 2004, response, the applicant stated that the turbine lube oil system provides lubricating oil to the main turbine generator bearings. It is a non-safety, low-energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system. Additional details of the turbine lube oil system can be found in FSAR Section 10.2.

In accordance with the revised scoping methodology, the applicant, in its November 9, 2004, RAI response, identified the following component types for the turbine lube oil system as being within the scope of license renewal and subject to an AMR:

- filter/strainers
- flow indicators
- flow orifices
- level indicators
- pipe
- steam generator feedwater pump lube oil cooler shell
- SGFP turbine lube oil reservoir
- tubing
- valves

2.3A.4.16.2 Staff Evaluation

The staff reviewed the information that the applicant provided in the November 9, 2004, and December 3, 2004, RAI responses for the turbine lube oil system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9 and December 3, 2004, RAI responses for the turbine lube oil system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.4.16.3 Conclusion

Based on its review of the supplemental information that the applicant provided in its responses dated November 9, 2004, and December 3, 2004, FSAR Section 10.2, and licensing basis information; the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the turbine lube oil system. Therefore, the staff concludes that the applicant adequately identified the turbine lube oil system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the turbine lube oil system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3A.4.17 Electro Hydraulic Control System

2.3A.4.17.1 Summary of Technical Information in the Application

The electro hydraulic control system is included in LRA Table 2.2-1 as within the scope of license renewal. However, the applicant under Note 1 to the Table 2.2-1 stated that this system does not contain any mechanical components that require an AMR. Therefore, there was no screening results table and system description for this system in the LRA. Resulting from the revised scoping methodology described in the November 9, 2004, RAI response, the applicant added portions of the electro hydraulic control system that could spatially interact with safety-related SSCs.

The applicant provided the electro hydraulic control systems description and a list of mechanical component types that were added to the scope of license renewal for electro hydraulic control system in its RAI 2.1-1 response, dated December 3, 2004. The applicant stated that the electro hydraulic control system provides high-pressure hydraulic fluid for the operation of the main turbine valves. The electro hydraulic control system provides signals to trip the turbine and provides a signal, which is based on turbine first-stage pressure, to the reactor regulating system as a load reference. It provides turbine-trip signal input to the reactor protection system and is a non-safety, low energy system that contains components that have been identified to affect a function of a safety-related system due to the proximity of this system to the safety-related system. Additional details of the electro hydraulic control system can be found in FSAR Section 10.2.

In the December 3, 2004, response, the applicant identified the following component types that were added to the scope of the electro hydraulic control system due to the changed scoping methodologies:

- filters/strainers
- flexible hoses
- flow indicators

- pipe
- pumps
- tubing
- hydraulic fluid coolers
- valves

2.3A.4.17.2 Staff Evaluation

The staff reviewed the supplemental information that the applicant provided in the November 9, 2004, and December 3, 2004, RAI responses for the electro hydraulic control system using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the November 9 and December 3, 2004, responses for the electro hydraulic control system in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3A.4.17.3 Conclusion

Based on its review of the information that the applicant provided in its responses dated November 9, 2004, and December 3, 2004, FSAR Section 10.2, and licensing basis information; the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the electro hydraulic control system. Therefore, the staff concludes that the applicant adequately identified the electro hydraulic control system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified the electro hydraulic control system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B Unit 3 System Scoping and Screening Results – Mechanical Systems

2.3B.1 Reactor Coolant System

In LRA Section 2.3B.1, the applicant identified the structures and components of the reactor coolant system (RCS) that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the reactor coolant system in the following sections of the LRA:

- 2.3.1.1 reactor vessel
- 2.3.1.2 reactor vessel internals
- 2.3.1.3 reactor coolant system
- 2.3.1.4 steam generator

The corresponding subsections of this SER (2.3B.1.1 - 2.3B.1.4, respectively) present the staff's related review findings.

2.3B.1.1 Reactor Vessel

2.3B.1.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.1, the applicant described the reactor vessel. The reactor vessel is a Westinghouse-designed, four-loop pressure vessel consisting of a cylindrical shell with a welded, hemispherical lower head and a flanged, hemispherical upper head. The reactor vessel provides a container for the reactor core and the primary coolant in which the core is submerged.

The reactor vessel directly maintains the RCS pressure boundary and supports and contains the reactor core and core support structures. Additionally, the reactor vessel provides a function that supports pressurized thermal shock.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides structural and/or functional support related to mechanical components

In LRA Table 2.3.1-1 the applicant identified the following reactor vessel component types that are within the scope of license renewal and subject to an AMR: bottom-mounted instrumentation (BMI) flux thimble tubes; BMI guide tubes; bottom head; closure head dome; closure head flange; closure head lifting lugs; closure head stud assembly; core support pads; control rod drive mechanism (CRDM) head penetration nozzle; CRDM head penetration nozzle flange; CRDM pressure housings; head vent pipe; instrument tubes; instrument tubes extension; instrumentation tubes (bottom head); intermediate and lower shell; primary nozzles; primary nozzle safe end; seal table and fittings; upper shell; vessel flange and core support ledge.

2.3B.1.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.1 and Millstone FSAR Sections 3.9N.4, 4.5.1, 5.1, 5.2, and 5.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.1 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In RAI 2.3.1.1-1(b), the staff requested the applicant to verify whether nozzle support pads, which are located below the primary nozzles and provide support for the reactor vessel, were included within the scope of license renewal and subject to an AMR, or to provide an explanation for the exclusion. In response, the applicant stated the reactor nozzle support pads are integral with four of the eight primary nozzles and are within the scope of license renewal and subject to aging management review. The nozzle support pads are included in the "Primary Nozzles" subcomponents in LRA Table 2.3.1-1. Based on the inclusion of the above components, the staff finds the applicant's response acceptable.

In RAI 2.3.1.1-3, the staff requested the applicant to verify whether the lower internals assembly, which hangs from the core's support ledge and provides structural support for in-scope components, has been included within the scope of license renewal and is subject to an AMR, or to provide an explanation for the exclusion. In response, the applicant stated the reactor vessel lower internals assembly is included within the scope of license renewal and subject to an AMR. The components of the lower internals assembly are included in LRA Section 2.3.1-2, "Reactor Vessel Internals." Based on the inclusion of the above component, the staff finds the applicant's response acceptable.

2.3B.1.1.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor vessel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor vessel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.1.2 Reactor Vessel Internals

2.3B.1.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.2, the applicant described the reactor vessel internals (RVIs). The RVIs are designed to provide a passageway for the distribution of reactor coolant flow to the reactor core; support and orientation of the reactor core; support, orientation, guidance, and protection of the rod cluster control assemblies (RCCAs); gamma and neutron shielding for the reactor vessel; a passageway for support, guidance, and protection of incore instrumentation; and a secondary support structure for limiting the core support structure downward displacement.

The RVIs support the reactor core in a coolable geometry and provide a RCCA insertion path.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support related to mechanical components
- provides for flow distribution

In LRA Table 2.3.1-2, the applicant identified the following RVI component types that are within the scope of license renewal and subject to an AMR: baffle/former bolts; baffle/former plates; BMI columns; clevis insert bolts; clevis inserts; core barrel; core barrel flange; core barrel outlet nozzles; head and vessel alignment pins; head cooling spray nozzles; hold-down spring; lower core plate; lower fuel alignment pins; lower support forging; lower support plate column bolts;

lower support plate columns; neutron panels; radial; RCCA guide tube bolts; RCCA guide tube support pins; RCCA guide tubes; secondary core support; upper core plate; upper core plate alignment pins; upper fuel alignment pins; upper instrumentation columns; upper support column bolts; upper support columns; and upper support plate.

2.3B.1.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.2, Millstone FSAR Sections 3.9N.5 and 4.5.2, FSAR Table 5.2-3, and FSAR Figures 3.9N-8 through 3.9N-12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.2 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In RAI 2.3.1.2-2, the staff requested the applicant to verify whether the core support, which is welded to the core barrel and provides structural support for in-scope equipment, is within the scope of license renewal and subject to an AMR or to provide an explanation for its exclusion. The applicant confirmed the core support is within the scope of license renewal and identified as the “Lower support forging” in LRA Table 2.3.1-2. Based on the inclusion of the above component, the staff finds the applicant’s response acceptable.

2.3B.1.2.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the RVI components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the RVI components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.1.3 Reactor Coolant System

2.3B.1.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.3, the applicant described the RCS. The RCS is designed to contain pressurized treated water and transfer heat produced in the reactor core to the steam generators. Borated treated water is circulated through the core at a flow rate and temperature consistent with achieving the desired reactor core thermal-hydraulic performance. The RCS provides a pressure boundary for containing the primary coolant, serves to confine radioactive material, and limits the uncontrolled release of radioactive material.

The safety-related intended functions of the RCS are to provide a closed pressure boundary for containing the primary coolant, transfer heat from the reactor core to the steam generator, provide system over-pressure protection, provide RG 1.97 safety-related indications, provide a reactor plant component cooling system pressure boundary, provide a letdown path via the head vent system under post-accident conditions, and provide a means of venting non-condensable gases from system high points after an accident. The RCS contains NSR components credited for mitigating a high-energy line break (HELB) and NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The RCS contains environmental qualification components and supports fire protection, station blackout, and pressurized thermal shock.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow
- provides a spray pattern
- provides structural and/or functional support related to mechanical components
- limits thermal cycling

In LRA Table 2.3.1-3, the applicant identified the following RCS component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; flow indicators; flow orifices; pipe; pressurizer; pressurizer heaters; reactor coolant pump (RCP) motor lower lube oil coolers; RCP motor stator coolers; RCP thermal barriers; RCP motor upper lube oil coolers; reactor coolant pressurizer relief tank; RCPs; rupture discs; thermal sleeves; tubing; and valves.

2.3B.1.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.3, Millstone FSAR Chapter 5, and FSAR Figures 5.1-1, 5.1-2, 5.2-3, and 5.4-1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.1.3 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In RAI 2.3.1.3-1, the staff requested the applicant to verify whether the following pressurizer components set forth in Table 2.3B-1 were included within the scope of license renewal and require an AMR or, alternately, to provide an explanation for their exclusion.

Table 2.3B-1 Pressurizer Components that Require Additional Scoping Status Information

Subcomponent	Intended Function
Pressurizer - Nozzles (Surge, Spray, Safety, Relief, Instrument)	Pressure Boundary
Pressurizer - Nozzle Safe Ends	Pressure Boundary
Pressurizer - Heater Sheath	Pressure Boundary
Pressurizer - Manway and Cover	Pressure Boundary
Pressurizer - Surge Line	Pressure Boundary
Pressurizer - Spray Head Assembly	Spray Pattern
Pressurizer - Support Lugs	Structural Support
Pressurizer - Support Skirt and Flange	Structural Support

In a response dated November 9, 2004, the applicant confirmed that the pressurizer, including all subcomponents that perform intended functions, is included within the scope of license renewal and is subject to an AMR. The applicant further stated that the pressurizer was evaluated as part of the RCS and is not considered a major component. Therefore, pressurizer subcomponents are not listed separately in LRA Table 2.3.1-3. The applicant stated that the subcomponents listed in the table above are included in the component types “Pressurizer” and “Pressurizer Heaters” in LRA Table 2.3.1-3. Subcomponents of the pressurizer are set forth in LRA Table 3.1.2-3. Based on the inclusion of the above components, the staff finds the applicant’s response acceptable.

In RAI 2.3.1.3-2(b), the staff requested the applicant to verify whether the pump casing and main flange, which provide a RBCCW system pressure boundary, are within the scope of license renewal and subject to an AMR. The RCP casing, cover (main flange), thermal barrier (including the integral heat exchanger) and closure bolting are considered part of the RCS boundary. The upper and lower reactor coolant pump motor lube oil coolers and the outer tubes of the seal cooler provide a reactor building closed-cooling-water-system pressure boundary. In response dated November 9, 2004, the applicant confirmed the RCP casing and main flange are within the scope of license renewal and subject to an AMR. The applicant stated that these items are considered subcomponents of the RCP and are included in the component type, “Reactor Coolant Pump,” in LRA Table 2.3.1-3. The pump casing is identified in LRA Table 3.1.2-3 as “Reactor Coolant Pumps (Casing).” The RCP cover (main flange) and thermal barrier are an integral part and are identified as “RCP Thermal Barriers” in Table 3.1.2-3.

In RAI 2.3.1.3-3, the staff requested the applicant to verify whether the RCS welds, which are included in the evaluation boundary for the RCS, are within the scope of license renewal and subject to an AMR. In a response dated July 26, 2004, the applicant confirmed that the RCS welds are within the scope of license renewal and require an AMR. Welds are considered a part of the host component (e.g., pipe, nozzle) and are not uniquely identified in LRA Table 2.3.1-3. Based on the inclusion of the above component, the staff finds the applicant's response acceptable.

2.3B.1.3.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the RCS components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the RCS components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.1.4 Steam Generator

2.3B.1.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.4, the applicant described the steam generator. The nuclear steam supply system (NSSS) utilizes four Westinghouse Model F steam generators to transfer the heat generated in the RCS to the secondary system and produce steam at the warranted steam pressure and quality.

The steam generator directly maintains the RCS pressure boundary, supports the capability to shut down the reactor and maintain it in a safe shutdown condition, and supports the capability to prevent or mitigate the discharge of radioactive coolant into the secondary cycle. Additionally, the steam generator provides for core heat removal in support of station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support related to mechanical components
- provides for flow distribution
- provides a pressure boundary
- restricts flow

In LRA Table 2.3.1-4, the applicant identified the following steam generator component types that are within the scope of license renewal and subject to an AMR: anti-vibration bars; divider plate; feedwater inlet ring and support; feedwater nozzle and safe end; lower head; lower head drain nozzle; primary manway bolting; primary manway cover and diaphragm; primary nozzle and safe end; secondary-manway and handhole bolting; secondary manway and handhole covers; secondary-side nozzles (except steam and feedwater); stay rods; steam nozzle and safe end; steam nozzle flow restrictor; top head; transition cone; tube plugs; tube support plates; tubes; tubesheet; upper and lower shell; upper support trunnions; and wrapper.

2.3B.1.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.4, Millstone FSAR Section 5.4.2, and FSAR Figure 5.4-3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.1.4.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the steam generator components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the steam generator components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.2 Engineered Safety Features Systems

In LRA Section 2.3.2, the applicant identified the structures and components of the engineered safety features (ESF) systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the ESF systems in the following sections of the LRA:

- 2.3.2.1 containment recirculation system
- 2.3.2.2 quench spray system
- 2.3.2.3 safety injection system
- 2.3.2.4 residual heat removal system
- 2.3.2.5 fuel pool cooling and purification system

The corresponding subsections of this SER (2.3B.2.1 - 2.3B.2.5, respectively) present the staff’s related review findings.

2.3B.2.1 Containment Recirculation System

2.3B.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.1, the applicant described the containment recirculation system. The containment recirculation system, in conjunction with the quench spray system, removes heat from the containment atmosphere following a major primary or secondary pipe rupture inside the containment. Heat is transferred to the service water (SW) system via the containment recirculation system coolers.

The containment recirculation system provides heat removal from the containment, a source of water to the safety injection pumps and charging pumps during the recirculation phase, sump water pH control, RG 1.97 safety-related indications, and containment pressure boundary integrity. The containment recirculation system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The containment recirculation system also contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides a spray pattern
- restricts flow
- provides structural and/or functional support related to mechanical components

In LRA Table 2.3.2-1, the applicant identified the following containment recirculation system component types that are within the scope of license renewal and subject to an AMR: bolting; containment recirculation coolers; expansion joints; flow elements; flow indicators; hoses; pipe; pump seal coolers; pump seal head tanks; pumps; restricting orifices; spray nozzles; TSP baskets; tubing; and valves.

2.3B.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.1 and Millstone FSAR Section 6.2.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.2.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment spray system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment spray system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.2.2 Quench Spray System

2.3B.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.2., the applicant described the quench spray system. The quench spray system, in conjunction with the containment recirculation system, removes heat from the containment atmosphere during the injection phase following a major primary or secondary pipe rupture in containment. The quench spray system pumps cooled water from the refueling water storage tank (RWST) through the spray nozzles within the containment. The spray nozzles direct cooled, borated water spray downward from the upper regions of the containment to cool and depressurize the containment. The RWST includes an internal weir to prevent debris from entering the quench spray system pumps suction and a vortex breaker to prevent pump suction air entrainment at low-RWST water levels.

The quench spray system provides heat removal from containment; removal of fission products from the post-accident containment atmosphere via spray; and a source of borated water from the RWST to the residual heat removal pumps, the safety injection pumps, and the charging pump. Also, the system provides RG 1.97 safety-related indications and containment pressure boundary integrity. The quench spray system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The quench spray system also contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides for vortex suppression
- restricts flow
- provides a spray pattern

In LRA Table 2.3.2-2, the applicant identified the following quench spray system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; pipe; pumps; RWST; restricting orifices; spray nozzles; tubing; and valves.

2.3B.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.2 and Millstone FSAR Section 6.2.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.2 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In RAI SPSB-5, the staff requested the applicant to verify whether the refueling water coolers 3-QSS-E1A and EIB in the quench spray system, described on LRA drawing 25212-LR26915 sheet 1, refueling water recirculating pumps, have been included in the scope of license renewal and subject to an AMR, or to provide an explanation for their exclusion. In its response dated November 9, 2004, the applicant stated that the NSR RWST coolers shown on LR drawing 25212-LR26915, sheet 1, were not originally included within the scope of license renewal because the RWST temperature is maintained within limits in accordance with TS requirements. However, these coolers and associated piping and valves, were added to scope as NSR components spatially oriented such that their failure could prevent the function of safety-related SSCs. The stainless steel RWST cooler channel heads, piping, and valves are subject to loss of material in a treated water internal environment and in an atmosphere/weather external environment. This aging effect is managed by the chemistry control for primary systems program internally and the general condition monitoring AMP externally. The cooler shell, and cooling water piping, and valves, are carbon steel and are subject to loss of material in the treated water internal environment and in the atmosphere/weather external environment. The loss of material of internal surfaces is managed by the closed-cycle cooling water system AMP and external aging is managed by the general condition monitoring AMP. The staff finds this acceptable.

The staff found the applicant's response to RAI SPSB-5 acceptable, and the refueling water coolers and associated components are within the scope of license renewal. Therefore, the staff considers its concern described in RAI SPSB-5 resolved.

2.3B.2.2.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the quench spray system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the quench spray system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.2.3 Safety Injection System

2.3B.2.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.3, the applicant described the safety injection (SI) system. The purpose of the SI system is to provide a source of borated water to the RCS to ensure that the reactor is shutdown and to cool the core in the event of a design-basis accident. The SI system consists of the SI pumps, accumulators, and associated piping and components. The centrifugal charging pumps, described In LRA Section 2.3.3.15 Chemical and Volume Control System; and the residual heat removal pumps, described In LRA Section 2.3.2.4 Residual Heat Removal System, also provide SI flow to the RCS.

The SI system provides injection of borated water into the RCS following an accident, control of reactor core boron precipitation during long-term LOCA recovery, RCS pressure boundary integrity, containment pressure boundary integrity, and RG 1.97 safety-related indications. The SI system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The SI system also contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow

In LRA Table 2.3.2-3, the applicant identified the following SI system component types that are within the scope of license renewal and subject to an AMR: bolting; filter/strainers; flow elements; pipe; pumps; restricting orifices; SI accumulator tanks; SI pump lube oil coolers; SI pump lube oil reservoirs; tubing; and valves.

2.3B.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.3 and Millstone FSAR Section 6.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.2.3.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the safety injection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the safety injection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.2.4 Residual Heat Removal System

2.B3.2.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.4, the applicant described the residual heat removal system. The residual heat removal system transfers heat from the RCS to the reactor plant component cooling system via the residual heat removal system heat exchangers during plant cooldown and cold shutdown operations. The residual heat removal system pumps also provide low-pressure SI flow from the RWST in response to a major primary system pipe rupture within the containment.

The residual heat removal system provides SI flow following a LOCA, a flow path for cold-leg and hot-leg recirculation during long-term accident recovery, heat removal from the RCS for plant cooldown, overpressure protection for the RCS during shutdown conditions, RG 1.97 safety-related indications, RCS pressure boundary integrity, and containment pressure boundary integrity. The residual heat removal system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The residual heat removal system also contains environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.2-4, the applicant identified the following residual heat removal system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; pipe; pump seal coolers; pumps; residual heat removal heat exchangers; tubing; and valves.

2.3B.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.4 and Millstone FSAR Section 5.4.7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.2.4.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the residual heat removal system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the residual heat removal system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.2.5 Fuel Pool Cooling and Purification System

2.3B.2.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.5, the applicant described the fuel pool cooling and purification system. The fuel pool cooling and purification system removes decay heat generated by spent fuel assemblies stored in the spent fuel pool. Heat is transferred from the pool water to the reactor plant component cooling system.

The fuel pool cooling and purification system provides heat removal from the spent fuel pool, containment pressure boundary integrity, and RG 1.97 safety-related indications. The fuel pool cooling and purification system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The fuel pool cooling and purification system also contains environmental qualification components and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides for vortex suppression

In LRA Table 2.3.2-5, the applicant identified the following fuel pool cooling and purification system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; fuel pool coolers; pipe; pumps; tubing; valves; and vortex suppressor.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the fuel pool cooling and purification system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the fuel pool cooling and purification system:

- fuel pool demineralizer
- fuel pool post filter
- strainers

2.3B.2.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.5 and Millstone FSAR Section 9.1.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The Millstone FSAR states that water from the safety-related SW system can be used as an emergency supply to the spent fuel pool. In addition, water from the fire protection system and borated water from the refueling water storage tank, a Seismic Category-I tank, is available. A license renewal drawing shows the portion of the SW system as within the scope of license renewal and subject to an AMR. However, only a portion of the quench spray from the refueling water storage tank is shown to be within the scope of license renewal and subject to an AMR. The piping and valves that lead to the fuel pool from this location are not shown to be within the scope of license renewal and subject to an AMR. In RAI 2.3.2.5-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the sources of make-up water to the fuel pool from the various sources from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that, as stated in the Millstone Unit 3 FSAR, the spent fuel pool is a missile-protected, seismically-designed, reinforced concrete structure with a stainless steel liner. Each pipe that enters the fuel pool has an anti-siphoning device or terminates at an elevation above the minimum fuel pool water level to prevent siphoning the fuel pool water and uncovering the spent fuel. The combination of these design features makes significant loss of fuel pool water extremely unlikely. In addition, the spent fuel pool liner is within the scope of license renewal and is managed for the effects of aging, as described in the Section 2.4.2.4, such that significant leakage is not expected. FSAR Section 9.1.3.2 discusses each of the sources of make-up water to the spent fuel pool for completeness. The safety-related SW system has been identified with the intended function to provide an emergency supply of fuel pool make-up in the LRA Section 2.3.3.2. Other fuel pool make-up sources discussed in the FSAR are available but are not assigned a fuel pool make-up intended function. Consequently, the applicant concluded that the fuel pool make-up flow path from the refueling water storage tank via quench spray is not within the scope of license renewal for its fuel pool make-up capability.

The staff finds the applicant's response to RAI 2.3.2.5-1B acceptable, because adequate explanation that a source of make-up water to the fuel pool from the SW system is credited for this purpose in the Millstone FSAR and is within the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.2.5-1B is resolved.

The staff also reviewed the results of the scoping methodology changes, due to response to RAI 2.1-1 that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the fuel pool cooling and purification system expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included the NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the fuel pool cooling and purification system is acceptable.

2.3B.2.5.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the fuel pool cooling and purification system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the fuel pool cooling and purification system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3 Auxiliary Systems

In LRA Section 2.3.3, the applicant identified the structures and components of the auxiliary systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the auxiliary systems in the following sections of the LRA:

- 2.3.3.1 circulating water system
- 2.3.3.2 service water system
- 2.3.3.3 sodium hypochlorite system
- 2.3.3.4 reactor plant component cooling system
- 2.3.3.5 turbine plant component cooling water system
- 2.3.3.6 chilled water system
- 2.3.3.7 charging pumps cooling system
- 2.3.3.8 safety injection pumps cooling system
- 2.3.3.9 neutron shield tank cooling system
- 2.3.3.10 containment atmosphere monitoring system
- 2.3.3.11 containment instrument air system
- 2.3.3.12 instrument air system
- 2.3.3.13 nitrogen system
- 2.3.3.14 service air system
- 2.3.3.15 chemical and volume control system
- 2.3.3.16 reactor plant sampling system
- 2.3.3.17 primary grade water system
- 2.3.3.18 auxiliary building ventilation system
- 2.3.3.19 circulating and service water pumphouse ventilation system
- 2.3.3.20 containment air filtration system
- 2.3.3.21 containment air recirculation system
- 2.3.3.22 containment purge air system
- 2.3.3.23 containment leakage monitoring system
- 2.3.3.24 containment vacuum system
- 2.3.3.25 control building ventilation system
- 2.3.3.26 CRDM ventilation and cooling system
- 2.3.3.27 emergency generator enclosure ventilation system
- 2.3.3.28 engineered safety features building ventilation system
- 2.3.3.29 fuel building ventilation system

- 2.3.3.30 hydrogen recombiner and hydrogen recombiner building HVAC system
- 2.3.3.31 main steam valve building ventilation system
- 2.3.3.32 process, effluent and airborne radiation monitoring system
- 2.3.3.33 service building ventilation and air-conditioning system
- 2.3.3.34 station blackout diesel generator building ventilation system
- 2.3.3.35 supplementary leak collection-and-release system
- 2.3.3.36 technical support center HVAC and filtration system
- 2.3.3.37 turbine building area ventilation system
- 2.3.3.38 waste disposal building ventilation system
- 2.3.3.39 Unit 2 fire protection system
- 2.3.3.40 Unit 3 fire protection system
- 2.3.3.41 domestic water system
- 2.3.3.42 emergency diesel generator system
- 2.3.3.43 emergency diesel generator fuel oil system
- 2.3.3.44 station blackout diesel generator system
- 2.3.3.45 security system
- 2.3.3.46 boron recovery system
- 2.3.3.47 radioactive liquid waste processing system
- 2.3.3.48 radioactive gaseous waste system
- 2.3.3.49 post-accident sampling system
- 2.3.3.50 radioactive solid waste system
- 2.3.3.51 reactor plant aerated drains system
- 2.3.3.52 reactor plant gaseous drains system
- 2.3.3.53 sanitary water system

The corresponding subsections of this SER (2.3B.3.1 - 2.3B.3.53, respectively) present the staff's related review findings.

2.3B.3.1 Circulating Water System

2.3B.3.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.1, the applicant described the circulating water system. The circulating water system provides a supply of cooling water to the main condenser via six vertical wet-pit pumps, which circulate water from the intake structure through the main condenser to the discharge structure. The circulating water pumps take suction on Long Island Sound. A warm water recirculation flowpath is provided to circulate condenser outlet water to the intake structure to reduce ice formation.

The circulating water system provides warm water recirculation to the intake structure for de-icing to ensure service water system availability.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-1, the applicant identified the following circulating water system component types that are within the scope of license renewal and subject to an AMR: expansion joints; pipe; and valves.

2.3B.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.1 and Millstone FSAR Sections 2.4.11.6, 9.2.5, and 10.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the circulating water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the circulating water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.2 Service Water System

2.3B.3.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.2, the applicant described the service water (SW) system. The purpose of the SW system is to provide a dependable flow of cooling water to the following safety-related and NSR loads:

- reactor plant component cooling heat exchangers
- turbine plant component cooling heat exchangers
- emergency generator diesel engine coolers
- containment recirculation coolers
- control building HVAC condensers
- containment recirculation pump ventilation units
- residual heat removal pump ventilation units
- charging pump coolers
- safety injection pump coolers
- post-accident liquid sample cooler
- motor controller center and rod control area ventilation units

The system also provides a source of lubrication water for the circulating water pump bearings. The SW system also provides a back-up water source for spent fuel pool make-up, auxiliary feedwater pump suction, and control building chilled water.

The SW system provides cooling water flow to safety-related heat loads to transfer rejected heat to the ultimate heat sink; isolating NSR heat loads in the event of a design-basis accident; providing a back-up source of water for control building chilled water, spent fuel pool make-up, and auxiliary feedwater; and providing RG 1.97 safety-related indications. The SW system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The SW system also provides environmental qualification equipment and supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides filtration
- restricts flow

In LRA Table 2.3.3-2, the applicant identified the following SW system component types that are within the scope of license renewal and subject to an AMR: expansion joints; filter/strainers; flow elements; pipe; pumps; restricting orifices; spool piece; tubing; and valves.

2.3B.3.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.2 and Millstone FSAR Sections 6.2.2, 7.3.1.1, 8.3.1, 9.1.3, 9.2.1, 9.2.2, and 9.2.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.2 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the SW system shows an in-line flow indicator within the scope of license renewal and subject to an AMR. However, this component is not listed in LRA Table 2.3.3-2 as a component type subject to an AMR. In-line flow indicators serve a pressure boundary intended function, and are passive and long-lived components. In RAI 2.3.3.2-1B, dated June 9, 2004, the staff requested the applicant to confirm that the in-line flow indicator is included with the components listed in LRA Table 2.3.3-2.

In its response, dated July 26, 2004, the applicant stated that the flow indicator incorporates a straight piece of pipe with a pilot tube for measuring differential pressure and is included in the component type, "Pipe," in LRA Table 2.3.3-2.

The staff finds the applicant's response to RAI 2.3.3.2-1B acceptable, because the flow indicator was adequately identified and shown where it appeared in LRA Table 2.3.3-2. The staff concludes that the in-line flow indicator in the SW system was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.2-1B is resolved.

In its review, the staff also noted that a license renewal drawing for the SW system shows thermowells excluded from the scope of license renewal and from being subject to an AMR. Thermowells normally penetrate the piping pressure boundary and therefore serve a pressure boundary intended function. Thermowells are also passive and long-lived components and should be subject to an AMR. In RAI 2.3.3.2-2B, dated June 9, 2004, the staff requested the applicant to confirm that the thermowells are included with the components listed in LRA Table 2.3.3-2.

In its response, dated July 26, 2004, the applicant stated that thermowells are within the scope of license renewal and are included in component type, "Pipe," in LRA Table 2.3.3-2.

The staff finds the applicant's response to RAI 2.3.3.2-2B acceptable, because thermowells were adequately identified and specified how they were represented in LRA Table 2.3.3-2. The staff concludes that thermowells in the SW system were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.2-2B is resolved.

Another license renewal drawing for the SW system indicates that a portion of the system that extends to the plant drainage system is within the scope of license renewal and subject to an AMR. The portion of the SW system that appears on the plant drainage system drawing is not included in the LRA. In RAI 2.3.3.2-3B, dated June 9, 2004, the staff requested the applicant to supply the drawing that contains the remainder of the SW system.

In its response, dated July 26, 2004, the applicant stated that the drawing for the plant drainage system shows only miscellaneous floor drains, none of which are within the scope of license renewal. The drainage lines shown on the SW system license renewal drawing are not continued on the plant drainage drawing because the drain lines are open-ended lines that discharge to, but are not connected to, the associated floor area drains. Therefore, the license renewal boundary terminates at the discharge of the drain line.

The staff finds the applicant's response to RAI 2.3.3.2-3B acceptable, because the applicant verified that all the components within the license renewal system evaluation boundary for the service water system have been shown on the license renewal drawings. The staff concludes that all the components of the SW system were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.3-3B is resolved.

2.3B.3.2.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.3 Sodium Hypochlorite System

2.3B.3.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.3, the applicant described the sodium hypochlorite system. The sodium hypochlorite system provides a source of sodium hypochlorite to minimize marine growth in the SW system and the circulating water system.

The sodium hypochlorite system provides a safety-related pressure boundary for the SW system and provides RG 1.97 safety-related indications. The sodium hypochlorite system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The sodium hypochlorite system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-3, the applicant identified the following sodium hypochlorite system component types within the scope of license renewal and subject to an AMR: pipe and valves.

2.3B.3.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.3 and Millstone FSAR Sections 9.2.1 and 9.2.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.3.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the sodium hypochlorite system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the sodium hypochlorite system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.4 Reactor Plant Component Cooling System

2.3B.3.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.4, the applicant described the reactor plant component cooling (RPCC) system. The RPCC system is a closed-loop cooling system that transfers heat from reactor auxiliaries to the SW system during plant operation and accident conditions. The RPCC system also provides make-up water to various cooling subsystems.

The RPCC system transfers heat from safety-related heat loads to the ultimate heat sink, providing automatic isolation of non-essential heat loads in the event of a design-basis accident, providing a source of make-up water to essential systems, providing RG 1.97 safety-related indications, preventing an over-temperature condition at the residual heat removal heat exchanger outlet, and providing containment pressure-boundary integrity. The RPCC system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- provides for heat transfer

In LRA Table 2.3.3-4, the applicant identified the following RPCC system component types that are within the scope of license renewal and subject to an AMR: flow elements; flow totalizer; hoses; penetration coolers; pipe; pumps; RPCC chemical addition tank; RPCC heat exchangers; RPCC surge tank; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the RPCC system. In its December 3, 2004, RAI response, the applicant identified the radiation detectors component type that was added to the scope of the RPCC system.

2.3B.3.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.4 and Millstone FSAR Section 9.2.2.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.4 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the RPCC system shows a line that ends at a relief valve. It appears that this relief valve is used to protect the in-scope piping and components from over-pressurization. Although the line is shown within the scope of license renewal, the relief valve is shown as outside the scope of license renewal. Relief valves provide pipeline isolation and serve a pressure boundary function. In RAI 2.3.3.4-1B, dated June 9, 2004, the staff requested the applicant to explain why the relief valve is not included within the scope of license renewal and subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the relief valve is within the scope of license renewal but was inadvertently not highlighted on the license renewal drawing. This relief valve is included in the component type, "Valves," in LRA Table 2.3.3-4.

The staff finds the applicant’s response to RAI 2.3.3.4-1B acceptable based on inclusion of the component.

The staff also noted that a license renewal drawing for the RPCC system shows auxiliary condensate heat exchanger shells within the scope of license renewal and subject to an AMR. However, these heat exchanger shells are not listed in LRA Table 2.3.3-4 as a component type subject to an AMR. In RAI 2.3.3.4-2B, dated June 9, 2004, the staff requested the applicant to explain whether these components were included with another component type or to explain their exclusion from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the auxiliary condensate heat exchanger shells are coolers shown on the license renewal drawing and are within the scope of license renewal and subject to AMR. These coolers are part of the auxiliary boiler condensate and feedwater system and are indicated as "Sample Coolers" in LRA Table 2.3.4-7. The sample coolers were inadvertently highlighted as part of the RPCC system.

The staff finds the applicant’s response to RAI 2.3.3.4-2B acceptable, because the applicant adequately explained that the auxiliary condensate heat exchanger shells are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a). The applicant further identified where the auxiliary condensate heat exchanger shells are represented in the LRA. Therefore, the staff’s concern described in RAI 2.3.3.4-2B is resolved.

In RAI 2.3.3.4-3B, the staff noted that in Millstone LRA Section 2.1.5.1 states that “a normally-open manual valve may be used as a license renewal boundary in those instances where a failure downstream of the valve can be quickly detected and the valve can be easily closed by operators to establish the pressure boundary.”

Another license renewal drawing for the RPCC system shows many normally open valves that are used as license renewal system boundaries. In order for the staff to complete its review to ensure that the system evaluation boundaries chosen for the RPCC system would permit successful performance of its system-level intended functions more information is needed. In RAI 2.3.3.4-2B, dated June 6, 2004, the staff requested the applicant to discuss procedures for identifying the locations of breaks and for closing the valves, the amount of time required to complete these actions, and the consequences on system inventory if the valves are not closed.

In its response, dated July 26, 2004, the applicant stated that the license renewal boundaries ending at normally open valves on the license renewal drawings for the RPCC system were not drawn using the convention from LRA Section 2.1.5.1. Instead, the components highlighted in lines associated with these normally open valves are within the scope of license renewal because they are NSR components spatially oriented near safety-related SSCs. The applicant further stated that the conventions used in license renewal drawings to highlight how to end boundaries at normally open valves is described in LRA Section 2.1 5.1. Normally open valves outside the area containing safety-related SSCs were used to identify the license renewal boundary, in accordance with the convention in LRA Section 2.1.5.1. Whether the valves are in an open or closed status is not relevant, because breaks beyond these normally open valves do not have the potential to adversely impact safety-related SSCs.

The staff finds the applicant's response to RAI 2.3.3.4-3B acceptable, because the applicant adequately explained that the normally open valves chosen as license renewal boundaries are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for their potential spatial impact on safety-related equipment. The applicant further confirmed that breaks beyond the normally open valves in the RPCC system would not functionally prevent the satisfactory accomplishment of the system-level intended functions. Therefore, the staff's concern described in RAI 2.3.3.4-3B is resolved.

The staff also reviewed the results of the scoping methodology changes, due to response to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the RPCC system expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant included the NSR components with the configurations that meet the scoping criteria of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the RPCC system is acceptable.

2.3B.3.4.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the RPCC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the RPCC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.5 Turbine Plant Component Cooling Water System

2.3B.3.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.5, the applicant described the turbine plant component cooling water system. The turbine plant component cooling water system transfers heat from various turbine plant heat loads to the SW system. A portion of the system provides a flowpath for back-up cooling water flow to the instrument air compressors from the domestic water system.

The turbine plant component cooling water system provides a cooling water flowpath for the instrument air compressor that is credited for fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-5, the applicant identified the following turbine plant component cooling water system component types that are within the scope of license renewal and subject to an AMR: flow indicators; pipe; strainers; and valves.

2.3B.3.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.5 and Millstone FSAR Section 9.2.7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that LRA Section 2.3.3.5 states that the turbine plant component cooling water system provides a cooling water flow path for the instrument air compressor needed for fire protection. In order for the staff to complete its review of the system evaluation boundaries for the turbine plant component cooling water system more information about why only instrument air compressor train B is shown within the scope of license renewal. In RAI 2.3.3.5-1B, dated June 9, 2004, the staff requested the applicant to explain why the turbine plant component cooling water system flow path to instrument air compressor train A is excluded from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the instrument air compressor credited in the plant fire protection evaluations is compressor B. Compressor B is powered from a Class 1E power source. Instrument air compressor A has not been credited in the plant fire protection evaluations. Therefore, instrument air compressor train A and the turbine plant component cooling water to that compressor have not been included within the scope of license renewal.

The staff concluded that the applicant's July 26, 2004, response related to the scoping and screening results of the turbine plant component cooling water system is acceptable.

2.3B.3.5.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the turbine plant component cooling water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the turbine plant component cooling water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.6 Chilled Water System

2.3B.3.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.6, the applicant described the chilled water system. The chilled water system is a closed-loop system that provides cooling water for the RWST, service building air-conditioning units, MCC and rod control area air conditioning units, containment air recirculation cooling coils, and various components inside the containment.

The chilled water system provides a pressure boundary at interfaces with safety-related systems, providing containment pressure boundary integrity, and providing RG 1.97 indications. The chilled water system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-6, the applicant identified the following chilled water system component types that are within the scope of license renewal and subject to an AMR: flow elements; flow indicators; hoses; pipe; tubing; and valves.

2.3B.3.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.6 and Millstone FSAR Section 9.2.2.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.6.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the chilled water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the chilled water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.7 Charging Pumps Cooling System

2.3B.3.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.7, the applicant described the charging pumps cooling system. The purpose of the charging pumps cooling system is to transfer heat from the charging pump lubricating oil to the SW system.

The charging pumps cooling system provides cooling for the charging pump lubricating oil and RG 1.97 safety-related indications. The charging pumps cooling system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides for heat transfer
- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-7, the applicant identified the following charging pumps cooling system component types that are within the scope of license renewal and subject to an AMR: charging pump coolers; charging pumps cooling surge tank; flow elements; pipe; pumps; tubing; and valves.

2.3B.3.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.7 and Millstone FSAR Section 9.2.2.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.7 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the FSAR states that the charging pump’s cooling system surge tank is compartmented by an internal partition so that a rapid loss of water from one compartment of the surge tank affects only one charging pump’s cooling pump, leaving the other charging pump’s cooling system pump unaffected and fully capable of service. However, the license renewal drawing shows the surge tank internal partition as outside the scope of license renewal and not subject to an AMR. In RAI 2.3.3.7-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the internal surge tank partition from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the internal surge tank partition was inadvertently not highlighted, but is within the scope of license renewal. The partition was evaluated as an integral part of the component type, "Charging Pump’s Cooling Surge Tank," shown in LRA Table 2.3.3-7.

In its review, the staff finds the applicant’s response to RAI 2.3.3.7-1B acceptable based on inclusion of the component.

2.3B.3.7.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the charging pumps cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the charging pumps cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.8 Safety Injection Pumps Cooling System

2.3B.3.8.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.8, the applicant described the safety injection pumps cooling system. The purpose of the SI pumps cooling system is to transfer heat from the SI pump bearing lubricating oil to the SW system.

The SI pumps cooling system provides cooling for the SI pump lubricating oil and RG 1.97 safety-related indications. The SI pumps cooling system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity
- restricts flow
- provides for heat transfer

In LRA Table 2.3.3-8, the applicant identified the following SI pumps cooling system component types that are within the scope of license renewal and subject to an AMR: flow elements; pipe; pumps; restricting orifices; SI pump coolers; SI pumps cooling surge tank; tubing; and valves.

2.3B.3.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.8 and Millstone FSAR Section 9.2.2.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.8 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the FSAR states that the SI pumps cooling system surge tank is compartmented by an internal partition so that a rapid loss of water from one compartment of the surge tank affects only one SI cooling pump, leaving the other SI cooling system pump unaffected and fully capable of service. However, a license renewal drawing for the SI pumps cooling system shows the surge tank internal partition as outside the scope of license renewal and not subject to an AMR. In RAI 2.3.3.8-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the internal surge tank partition from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the internal surge tank partition was inadvertently not highlighted, but is within the scope of license renewal. The partition was evaluated as an integral part of the component type, "Safety Injection Pump’s Cooling Surge Tank," shown in LRA Table 2.3.3-8.

The staff concluded that the applicant’s July 26, 2004, response related to the scoping results of the safety injection pumps cooling system is acceptable.

2.3B.3.8.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SI pumps cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SI pumps cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.9 Neutron Shield Tank Cooling System

2.3B.3.9.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.9, the applicant described the neutron shield tank cooling system. The purpose of the neutron shield tank cooling system is to cool the water circulated through the neutron shield tank, which is heated by neutron and gamma radiation from the reactor. The neutron shield tank cooling system also provides attenuation of neutrons via the water-filled neutron shield tank. The neutron shield tank cooling system includes the neutron shield tank, the neutron shield tank coolers, neutron shield tank cooling surge tank, and associated piping and components.

The neutron shield tank cooling system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC, provides neutron moderation in support of the nuclear instrumentation function, and provides cooling of the water surrounding the neutron detectors located in the neutron shield tank.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-9, the applicant identified the following neutron shield tank cooling system component types that are within the scope of license renewal and subject to an AMR: neutron shield tank; neutron shield tank coolers; neutron shield tank surge tank; pipe; tubing; and valves.

2.3B.3.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.9 and Millstone FSAR Section 9.2.2.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.9.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the neutron shield tank cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the neutron shield tank cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.10 Containment Atmosphere Monitoring System

2.3B.3.10.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.10, the applicant described the containment atmosphere monitoring system. The containment atmosphere monitoring system provides the capability to obtain, analyze, and return atmosphere samples to the containment.

The containment atmosphere monitoring system provides a containment pressure boundary integrity and isolation function and safety-related RG 1.97 indications. The containment atmosphere monitoring system contains environmental qualification equipment.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-10, the applicant identified the following containment atmosphere monitoring system component types that are within the scope of license renewal and subject to an AMR: bolting; pipes; and valves.

2.3B.3.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.10 and Millstone FSAR Section 11.5.2.2.9. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.10.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an

AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment atmosphere monitoring system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment atmosphere monitoring system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.11 Containment Instrument Air System

2.3B.3.11.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.11, the applicant described the containment instrument air system. The containment instrument air system is supplied by the instrument air system and provides a reliable source of clean, dry, oil-free compressed air at the proper pressure to supply air-operated valves, instruments, and other miscellaneous components in the containment. The system provides compressed air to operate valves associated with reactor coolant letdown and pressurizer spray for a fire in the containment.

The containment instrument air system supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-11, the applicant identified the following containment instrument air system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe; tubing; and valves.

2.3B.3.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.11 and Millstone FSAR Section 9.3.1.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.11.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its

review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment instrument air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment instrument air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.12 Instrument Air System

2.3B.3.12.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.12, the applicant described the instrument air system. The instrument air system provides a reliable source of clean, dry, oil-free compressed air at the proper pressure to supply air-operated valves, instruments, and other miscellaneous components in the plant.

The instrument air system provides containment pressure boundary integrity and safety-related RG 1.97 indications. The instrument air system contains environmental qualification equipment and supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-12, the applicant identified the following instrument air system component types that are within the scope of license renewal and subject to an AMR: air dryers; filters; instrument air aftercooler; instrument air compressor; instrument air filter silencer; instrument air receiver; pipe; strainers; traps; tubing; and valves.

2.3B.3.12.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.12 and Millstone FSAR Section 9.3.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.12.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the instrument air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the instrument air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.13 Nitrogen System

2.3B.3.13.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.13, the applicant described the nitrogen system. The nitrogen system provides clean, dry gas that is utilized in multiple applications throughout the plant.

The nitrogen system provides containment pressure boundary integrity and safety-related RG 1.97 indications. The nitrogen system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The nitrogen system also provides environmental qualification equipment and supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-13, the applicant identified the following nitrogen system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

2.3B.3.13.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.13 and Millstone FSAR Section 9.5.9.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.13.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the nitrogen system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the nitrogen system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.14 Service Air System

2.3B.3.14.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.14, the applicant described the service air system. The service air system provides a source of clean, oil-free compressed air at the proper pressure to support the operation of air-operated tools and other devices. The service air system can be used as a source of compressed air to the instrument air system.

The service air system provides a containment pressure boundary-integrity and a supplementary leak collection- and-release system boundary isolation function at ESF building wall penetrations.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-14, the applicant identified the following service air system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the service air system. In its December 3, 2004, RAI response, the applicant identified the flow transmitters component type that was added to the scope of the service air system.

2.3B.3.14.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.14 and Millstone FSAR Section 9.3.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.14 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that LRA Section 2.3.3.14 stated that the service air system can be used as a source of compressed air to the instrument air system. The Millstone FSAR states that during routine maintenance, the service air serves as a backup to the instrument air system. However, the only portion of service air that was shown to be within the scope of license renewal and subject to an AMR was the portion that penetrates the containment and provides a boundary-isolation function at the ESF building wall penetrations. In order to ensure that the system evaluation boundaries chosen for the service air system would permit successful performance of its system-level intended functions, the staff requires more information. In RAI 2.3.3.14-1B, dated June 9, 2004, the staff requested the applicant to explain why portions from the service air system that serve as a backup to instrument air were not included within the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the service air system capability of providing backup air to the instrument air system does not meet the criteria of 10 CFR 54.4(a)(1) or (a)(2). The NSR instrument air system is within the scope of license renewal because it provides containment pressure boundary integrity at the piping penetration and it supports fire protection. The fire protection analysis does not credit service air as a backup. Therefore, the portions of the service air system that serve as a backup to the instrument air system are not within the scope of license renewal.

The staff finds the applicant's response to RAI 2.3.3.14-1B acceptable, because the applicant adequately explained that while the instrument air system is credited in the fire protection evaluations, backup air from the service air system is not. Therefore backup compressed air from the service air system is not required to be within the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.3.14-1B is resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the service air system is acceptable.

2.3B.3.14.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the service air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the service air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.15 Chemical and Volume Control System

2.3B.3.15.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.15, the applicant described the chemical and volume control system (CVCS). The CVCS provides a method for controlling the inventory and chemistry of the RCS and supplies seal injection flow to the RCPs. During normal operation, reactor coolant letdown flow is cooled; conditioned via ion exchangers, filters, and chemical addition; heated; and returned to the RCS. The system also provides the capability to adjust reactor coolant soluble boron concentration in order to effect reactivity changes within the reactor core. During emergency conditions, the CVCS charging pumps provide a high-pressure source of borated water injection to the RCS.

The CVCS provides a borated water flowpath to the RCS for reactivity control and for safety injection in the event of an accident. The system also provides RCP seal injection flow; an RCS pressure boundary at system interfaces; boration, make-up, and RCP seal injection in support of safety-grade cold shutdown; decay heat removal, boration, and inventory control during shutdown conditions; auxiliary pressurizer spray; safety-related RG 1.97 indications; and containment penetration pressure boundary integrity. The CVCS contains NSR components credited for mitigating the effects of a high-energy line break and NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The CVCS also contains environmental qualification equipment and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow

In LRA Table 2.3.3-15, the applicant identified the following CVCS component types that are within the scope of license renewal and subject to an AMR: bolting; boric acid blender; boric acid tanks; charging pump lube oil coolers; chemical mixing tank; chiller surge tank; CS manifolds; demineralizers; excess letdown heat exchanger; filter/strainers; flexible hoses; flow elements; letdown chiller heat exchanger; letdown heat exchanger; letdown reheat heat exchanger; level indicators; lube oil reservoirs; moderating heat exchanger; pipe; pumps; RCP seal standpipes; regenerative heat exchanger; restricting orifices; seal water heat exchanger; thermal regeneration chiller compressor oil cooler; thermal regeneration chiller condenser; thermal regeneration chiller evaporator; tubing; valves; and volume control tank.

2.3B.3.15.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.15 and Millstone FSAR Section 9.3.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.15.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the CVCS components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the CVCS components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.16 Reactor Plant Sampling System

2.3B.3.16.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.16 the applicant described the reactor plant sampling system. The reactor plant sampling system provides the means for determining chemical and radiological conditions of plant processes and environments.

The reactor plant sampling system limits loss of inventory through sampling line breaks through the use of flow restrictions, providing a pressure boundary at interfaces with safety-related systems, providing containment penetration pressure boundary integrity, and providing safety-related RG 1.97 indications. The reactor plant sampling system contains NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The reactor plant sampling system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow

In LRA Table 2.3.3-16, the applicant identified the following reactor plant sampling system component types that are within the scope of license renewal and subject to an AMR: bolting; flexible hoses; pipe; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the reactor plant sampling system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the reactor plant sampling system:

- flow elements
- mechanical refrigeration unit condenser
- mechanical refrigeration unit evaporator/chiller
- radiation detectors

2.3B.3.16.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.16 and Millstone FSAR Section 9.3.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the reactor plant sampling system is acceptable.

2.3B.3.16.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor plant sampling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor plant sampling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.17 Primary Grade Water System

2.3B.3.17.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.17, the applicant described the primary grade water system. The primary grade water system provides demineralized water for use in primary and auxiliary systems in the plant.

The primary grade water system provides containment penetration pressure boundary integrity and safety-related RG 1.97 indications. The primary grade water system contains NSR components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The primary grade water system also contains environmental qualification equipment and supports station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-17, the applicant identified the following primary grade water system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe; and valves.

2.3B.3.17.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.17 and Millstone FSAR Section 9.2.8. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.17 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the primary grade water system shows the reactor coolant pressurizer relief tank internal spray line not within the scope of license renewal for license renewal while the shell of the tank is included within the scope of license renewal. The internal spray line appears to perform a LSI intended function. In RAI 2.3.3.17-1B, dated June 9, 2004, the staff requested the applicant to explain why the internal spray line was excluded from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the reactor coolant pressurizer relief tank is an NSR component. The pressurizer relief tank is within the scope of license renewal because it is spatially oriented such that its failure could prevent the satisfactory accomplishment of a safety-related function. The pressurizer relief tank spray line that is internal to the tank does not meet the criterion of 10 CFR 54.4(a)(2) since it is not spatially oriented near any safety-related SSCs. Therefore, the internal spray line is not within the scope of license renewal.

The staff finds the applicant’s response to RAI 2.3.3.17-1B acceptable because the applicant adequately explained that the pressurizer relief tank internal spray line does not present a potential for spatially interacting with safety-related SSCs; nor does it functionally support any system-level intended functions. The staff concludes that the pressurizer relief tank internal spray line in the pressurizer relief tank was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.17-1B is resolved.

2.3B.3.17.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the primary grade water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the primary grade water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.18 Auxiliary Building Ventilation System

2.3B.3.18.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.18, the applicant described the auxiliary building ventilation system. The auxiliary building ventilation system provides an environment suitable for personnel access and equipment operation within the building. It also controls and minimizes the potential for the spread of airborne radioactive material by maintaining a negative pressure within the building. The auxiliary building ventilation system is comprised of subsystems that provide local area cooling and heating within the building. There are two filtration units within the exhaust system that can be aligned to remove radioactive material from the ventilation exhaust flow. The system contains fire dampers to prevent the spread of a fire.

The auxiliary building ventilation system is within the scope of license renewal because the system provides an exhaust flowpath through filters and maintaining a negative pressure within the auxiliary building and other areas in the event of an accident, providing an acceptable operating environment for safety-related equipment, and providing RG 1.97 safety-related indications. The auxiliary building ventilation system provides isolation in support of the supplementary leak collection-and-release system, and the system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The auxiliary building ventilation system also contains environmental qualification equipment and supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides for heat transfer

In LRA Table 2.3.3-18, the applicant identified the following auxiliary building ventilation system component types that are within the scope of license renewal and subject to an AMR: auxiliary building filter bank housings; auxiliary building heating and ventilation air supply heating coils; damper housings; ductwork; filter bank housing; flex connections; flow elements; MCC, rod control and cable vault AC air supply cooling coils; MCC, rod control and cable vault AC air supply unit; pipe; silencers; tubing; and valves.

2.3B.3.18.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.18 and Millstone FSAR Section 9.4.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended

functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.18.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the auxiliary building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the auxiliary building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.19 Circulating and Service Water Pumphouse Ventilation System

2.3B.3.19.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.19, the applicant described the circulating and service water (SW) pumphouse ventilation system. The circulating and SW pumphouse ventilation system provides a suitable environment for personnel and equipment within the pumphouse. Each SW pump cubicle has a safety-related ventilation system.

The circulating and SW pumphouse ventilation system provides an acceptable operating environment for safety-related equipment and RG 1.97 safety-related indications. The circulating and SW pumphouse ventilation system also supports fire protection and station blackout.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-19, the applicant identified the following circulating and SW pumphouse ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; flex connections; and silencers.

2.3B.3.19.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.19 and Millstone FSAR Section 9.4.8.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.19.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the circulating and SW pumphouse ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the circulating and SW pumphouse ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.20 Containment Air Filtration System

2.3B.3.20.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.20, the applicant described the containment air filtration system. The containment air filtration system filters the containment atmosphere to reduce the concentration of airborne radioactive particulates and iodine to permit containment access. The containment air filtration system includes two 100-percent capacity fans and filter banks. Each filter bank includes a heater, prefilter, carbon adsorber, and two high-efficiency particulate air filters. There are fire detectors installed on the carbon adsorber units.

The containment air filtration system supports fire protection.

The applicant identified no component groups that require aging management review.

2.3B.3.20.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.20 and Millstone FSAR Section 9.4.7.1 using the evaluation methodology described in Section 2.3 of this SER. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3, “Scoping and Screening Results - Mechanical Systems.”

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In LRA Section 2.3.3.20, the applicant stated that the containment air filtration system meets 10 CFR 54.4(a)(3) and is within the scope of license renewal because the system supports fire protection. The applicant further stated that there are no containment air filtration system components that are subject to aging management review since only the active fire detector components are within the scope of license renewal.

On the basis of its review of the applicable FSAR section, the staff determined that the containment air filtration system is not a safety-related system, and agrees with the applicant’s determination that it meets 10 CFR 54.4(a)(3). The staff also determined that the acceptability of the applicant's treatment of this system will be addressed in the fire protection section of this SER.

2.3B.3.20.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment air filtration system components are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified that none of the containment air filter components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.21 Containment Air Recirculation System

2.3B.3.21.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.21, the applicant described the containment air recirculation system. The containment air recirculation system is designed to maintain the bulk air temperature in the containment suitable for personnel access and equipment operation during normal plant operation, and for equipment operation following a loss of offsite power. The containment air recirculation system supports a fire safe shutdown event.

The containment air recirculation system cooling coils are NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-20, the applicant identified the following containment air recirculation system component types that are within the scope of license renewal and subject to an AMR: containment air recirculation cooling coils; containment air recirculation cooling unit housings; damper housings; ductwork; fan/blower housings; flex connections; and tubing.

2.3B.3.21.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.21 and Millstone FSAR Section 9.4.7.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then

reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.21.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment air recirculation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment air recirculation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.22 Containment Purge Air System

2.3B.3.22.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.22, the applicant described the containment purge air system. The containment purge air system is designed to reduce the airborne radioactivity in the containment and to provide air exchange during extended periods of containment occupancy, such as during refueling outages.

The containment purge air system provides containment pressure boundary integrity and RG 1.97 safety-related indications. The containment purge air system provides isolation in support of the supplementary leak collection-and-release system, and the system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The containment purge air system also contains environmental qualification equipment and supports station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-21, the applicant identified the following containment purge air system component types that are within the scope of license renewal and subject to an AMR: containment purge heating and ventilation air supply heating coils; damper housings; ductwork; flex connections; pipe; and valves.

2.3B.3.22.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.22 and Millstone FSAR Section 9.4.7.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.22.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment purge air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment purge air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.23 Containment Leakage Monitoring System

2.3B.3.23.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.23, the applicant described the containment leakage monitoring system. The containment leakage monitoring system provides containment pressure signals to the ESF actuation system. The system can also be used for containment leak-rate testing.

The containment leakage monitoring system provides containment pressure boundary integrity and RG 1.97 safety-related indications and signals. The containment leakage monitoring system also contains environmental qualification equipment and supports station blackout.

Intended functions within the scope of license renewal include providing a pressure boundary.

In LRA Table 2.3.2-22, the applicant identified the following containment leakage monitoring system component types that are within the scope of license renewal and subject to an AMR: pipe; tubing; and valves.

2.3B.3.23.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.23 and Millstone FSAR Sections 6.2.6 and 7.6.7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.23.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment leakage monitoring system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment leakage monitoring system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.24 Containment Vacuum System

2.3B.3.24.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.24, the applicant described the containment vacuum system. The containment vacuum system establishes and maintains sub-atmospheric containment internal pressure during normal operations.

The containment vacuum system provides containment pressure boundary integrity and RG 1.97 safety-related indications. The containment vacuum system also contains environmental qualification equipment and supports station blackout.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-23, the applicant identified the following containment vacuum system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe; pumps and vacuum ejectors; and valves.

2.3B.3.24.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.24 and Millstone FSAR Section 9.5.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.24.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its

review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment vacuum system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the containment vacuum system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.25 Control Building Ventilation System

2.3B.3.25.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.25, the applicant described the control building ventilation system. The control building ventilation system provides heating, ventilation, and air conditioning to the control room envelope and switchgear area during normal operation. It also provides air supply, filtration, and cooling in post-accident conditions. The control room envelope consists of the control room area, shift manager's office, tagging office, viewing gallery and ramp, conference room, toilet, kitchen, instrument rack and computer room, piping/duct chase, and the mechanical and equipment room.

The control building ventilation system provides a suitable environment for equipment cooling and personnel habitability, the capability to isolate, pressurize, and control radiological conditions within the control room envelope in the event of an accident, and RG 1.97 safety-related indications. The control building ventilation system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The control building ventilation system also supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides for heat transfer
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow
- provides limited structural integrity

In LRA Table 2.3.3-24, the applicant identified the following control building ventilation system component types that are within the scope of license renewal and subject to an AMR: air storage tanks; chiller oil coolers; chiller reservoirs; compressors; condensers; control building air handling units; control room emergency ventilation filter bank housings; damper housings; duct flow restrictors; ductwork; economizers; evaporators; expansion joints; expansion tanks; fan/blower housings; filter/strainers; flex connections; flow elements; heaters; humidifiers; level indicators; moisture indicators; pipe; pumps; tubing; and valves.

2.3B.3.25.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.25 and Millstone FSAR Section 6.4.2 and 9.4.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.25.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the control building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the control building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.26 CRDM Ventilation and Cooling System

2.3B.3.26.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.26, the applicant described the control rod drive mechanism (CRDM) ventilation and cooling system. The CRDM ventilation and cooling system removes heat from the CRDM magnetic coils. Containment ambient air is drawn through the CRDM shroud and ductwork, and heat from the CRDM coils is transferred to the chilled water system via the CRDM shroud cooler cooling coils. The CRDM ventilation and cooling system contains three 50-percent fans, cooling coils, and a duct plenum.

The CRDM shroud cooler cooling coils are NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-25, the applicant identified the CRDM shroud cooler cooling coils as the CRDM ventilation and cooling system component type that is within the scope of license renewal and subject to an AMR.

2.3B.3.26.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.26 and Millstone FSAR Section 9.4.7.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.26.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the CRDM ventilation and cooling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the CRDM ventilation and cooling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.27 Emergency Generator Enclosure Ventilation System

2.3B.3.27.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.27, the applicant described the emergency generator enclosure ventilation system. The emergency generator enclosure ventilation system provides an acceptable environment for personnel and equipment within the building. The system includes tornado dampers.

The emergency generator enclosure ventilation system provides an acceptable operating environment for safety-related equipment and providing RG 1.97 safety-related indications. The emergency generator enclosure ventilation system supports fire protection and station blackout.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-26, the applicant identified the following emergency generator enclosure ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; and flex connections.

2.3B.3.27.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.27 and Millstone FSAR Section 9.4.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then

reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.27.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the emergency generator enclosure ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the emergency generator enclosure ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.28 Engineered Safety Features Building Ventilation System

2.3B.3.28.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.28, the applicant described the engineered safety features (ESF) building ventilation system. The ESF building ventilation system provides a suitable environment for equipment operation and personnel within the building. The ESF building ventilation system includes normal and emergency ventilation. The normal ventilation is operated during normal plant operation. Emergency ventilation contains five safety-related subsystems and four self-contained AC chiller units serving the safety injection pump, quench spray pump, residual heat removal pump, and ESF heat exchanger areas. These emergency ventilation subsystems automatically start when the associated ESF equipment is required to operate. The ESF building ventilation system contains fire dampers to prevent the spread of fires.

The ESF building ventilation system provides ESF building isolation in the event of an accident, an acceptable operating environment for safety-related equipment, and RG 1.97 safety-related indications. The ESF building ventilation system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides for heat transfer
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.3.3-27, the applicant identified the following ESF building ventilation system component types that are within the scope of license renewal and subject to an AMR: air handling units; compressors; condensers; damper housings; ductwork; fan/blower housings; filter dryer; filter/strainers; flex connections; flow indicators; pipe; suction traps; tubing; and valves

2.3B.3.28.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.28 and Millstone FSAR Section 9.4.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.28.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the ESF building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the ESF building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.29 Fuel Building Ventilation System

2.3B.3.29.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.29, the applicant described the fuel building ventilation system. The fuel building ventilation system provides a suitable environment for equipment operation and personnel within the building. The system is operated to limit the potential radioactive release by maintaining a negative operating pressure within the building and processing the exhaust air flow through a charcoal filter prior to release to the atmosphere. The system contains fire dampers to prevent the spread of fires.

The fuel building ventilation system provides an exhaust flowpath through filters and maintains a negative pressure within the fuel building in the event of a contaminated fuel building atmosphere, providing isolation of the normal exhaust flowpath via supply backdraft dampers, and RG 1.97 safety-related indications. The fuel building ventilation system provides isolation in support of the supplementary leak collection-and-release system, and the system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The fuel building ventilation system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-28, the applicant identified the following fuel building ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; flex connections; fuel building filter bank housings; heating coils; pipe; silencers; tubing; and valves.

2.3B.3.29.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.29 and Millstone FSAR Section 9.4.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.29.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the fuel building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the fuel building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.30 Hydrogen Recombiner and Hydrogen Recombiner Building HVAC System

2.3B.3.30.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.30, the applicant described the hydrogen recombiner and hydrogen recombiner building HVAC system. The hydrogen recombiner and hydrogen recombiner building HVAC system includes the hydrogen recombiner unit and the ventilation system associated with the hydrogen recombiner and the hydrogen recombiner building. The hydrogen recombiner controls the concentration of hydrogen within the containment to below the flammability limit following a LOCA. The hydrogen recombiner unit provides hydrogen recombiner return gas cooling to limit recombiner effluent temperature to 150 °F. The hydrogen recombiner building HVAC system provides hydrogen recombiner building heating and AC and hydrogen recombiner building post-accident exhaust. A high-radiation level in the hydrogen recombiner ventilation exhaust stream automatically shuts down the ventilation system and the hydrogen recombiner. The system contains fire dampers to prevent the spread of a fire.

The hydrogen recombiner and hydrogen recombiner building HVAC system limits the post-accident concentration of hydrogen in the containment, limiting the recombiner exhaust stream temperature to 150 °F, providing isolation of the ventilation system in a recombiner ventilation exhaust high-radiation condition, providing containment pressure boundary integrity, and providing RG 1.97 safety-related indications. The hydrogen recombiner and hydrogen recombiner building HVAC system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.3.3-29, the applicant identified the following hydrogen recombiner and hydrogen recombiner building HVAC system component types that are within the scope of license renewal and subject to an AMR: airblast heat exchangers; damper housings; ductwork; fan/blower housings; flex connections; flow elements; pipe; radiant heaters; reaction chamber; tubing; and valves.

2.3B.3.30.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.30 and MPS Unit 2 FSAR Sections 6.2.5 and 9.4.11. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.30.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the hydrogen recombiner and hydrogen recombiner building HVAC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the hydrogen recombiner and hydrogen recombiner building HVAC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.31 Main Steam Valve Building Ventilation System

2.3B.3.31.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.31, the applicant described the main steam valve building ventilation system. The main steam valve building ventilation system provides the environment suitable for personnel access and equipment operation within the building. The main steam valve building ventilation system also provides an isolation boundary function for the supplementary leak collection-and-release system.

The main steam valve building ventilation system provides a suitable environment for equipment cooling and personnel habitability, isolation in support of the supplementary leak collection-and-release system boundary, and RG 1.97 safety-related indications. The main steam valve building ventilation system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The main steam valve building ventilation system also contains environmental qualification equipment and supports station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-30, the applicant identified the following main steam valve building ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; flex connections; and heating coils.

2.3B.3.31.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.31 and Millstone FSAR Section 9.4.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.31.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the main steam valve building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the main steam valve building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.32 Process, Effluent, and Airborne Radiation Monitoring System

2.3B.3.32.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.32, the applicant described the process, effluent, and airborne radiation monitoring system. The process, effluent, and airborne radiation monitoring system provides indications and actuation signals based on detected radiation levels in plant areas and process streams.

The process, effluent, and airborne radiation monitoring system provides actuation signals in response to detected radiation levels and provides RG 1.97 safety-related indications. The process, effluent, and airborne radiation monitoring system also contains environmental qualification equipment.

The applicant identified no component groups that require aging management review.

2.3B.3.32.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.32 and Millstone FSAR Section 11.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.32.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified process, effluent, and airborne radiation monitoring system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified that there are no process, effluent, and airborne radiation monitoring components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.33 Service Building Ventilation and Air-Conditioning System

2.3B.3.33.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.33, the applicant described the service building ventilation and air-conditioning (AC) system. The service building ventilation and AC system provides an environment suitable for personnel access and equipment operation within the building. The system contains fire dampers to prevent the spread of a fire.

The service building ventilation and AC system provides an isolation boundary for the auxiliary building ventilation system. The system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-31, the applicant identified the following service building ventilation and AC system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; and flex connections.

2.3B.3.33.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.33 and Millstone FSAR Section 9.4.12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.33.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the service building ventilation and AC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the service building ventilation and AC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.34 Station Blackout Diesel Generator Building Ventilation System

2.3B.3.34.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.34, the applicant described the station blackout (SBO) diesel generator building ventilation system. The SBO generator building ventilation system provides an acceptable environment for personnel and equipment within the SBO diesel generator enclosure. The system consists of a self-contained AC unit for the SBO diesel generator control room and ventilation supply fans and dampers for the diesel room.

The SBO diesel generator building ventilation system supports SBO. The evaluation boundary of the SBO diesel generator building ventilation system consists of the SBO diesel generator control room AC unit and the diesel room fan housings.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.3-32, the applicant identified the following SBO diesel generator building ventilation system component types that are within the scope of license renewal and subject to an AMR: AC units, self contained; and fan/blower housings.

2.3B.3.34.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.34 and Millstone FSAR Section 8.3.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.34.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SBO generator building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SBO generator building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.35 Supplementary Leak Collection and Release System

2.3B.3.35.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.35, the applicant described the supplementary leak collection-and-release system. The purpose of the supplementary leak collection-and-release system is to collect containment post-accident leakage from the buildings contiguous to the containment and that house the containment penetrations and ESF equipment. The system maintains negative pressure in these areas, and it filters potentially contaminated air exhausted from these areas and releases it to the atmosphere through the stack. The system also includes fire dampers.

The supplementary leak collection-and-release system provides an exhaust flowpath through filters, maintaining a negative pressure within the areas contiguous to the containment in the event of an accident, and providing RG 1.97 safety-related indications. The supplementary leak collection-and-release system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-33, the applicant identified the following supplementary leak collection-and-release system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; fan/blower housings; flex connections; flow elements; pipe; supplementary leak collection-and-release filter bank housings; tubing; and valves.

2.3B.3.35.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.35 and Millstone FSAR Section 6.2.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.35.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the supplementary leak collection-and-release system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the supplementary leak collection-and-release system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.36 Technical Support Center HVAC and Filtration System

2.3B.3.36.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.36, the applicant described the technical support center HVAC and filtration system. The technical support center HVAC and filtration system provides a suitable environment for maintaining proper equipment operation and provides for radiological protection to personnel occupying the technical support center. The system includes a heat detector for the charcoal filter.

The technical support center HVAC and filtration system supports fire protection.

The applicant identified no component groups that require aging management review.

2.B3.3.36.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.36 and Millstone FSAR Section 9.4.13. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

In LRA Section 2.3.3.36 the applicant stated that the technical support center HVAC and filtration system meets 10 CFR 54.4(a)(3) and is within the scope of license renewal because the system supports fire protection. The applicant further stated that there are no technical support center HVAC and filtration system components that are subject to aging management review since only the active fire detector components are within the scope of license renewal.

On the basis of its review of the applicable FSAR section, the staff determined that the technical support center HVAC and filtration system is not a safety-related system, and agrees with the applicant's determination that it meets 10 CFR 54.4(a)(3). The staff also determined that the acceptability of the applicant's treatment of this system will be addressed in the fire protection Section of this SER.

2.3B.3.36.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant adequately identified technical support center HVAC and filtration system components are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant adequately identified there are no technical support center HVAC and filtration system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.37 Turbine Building Area Ventilation System

2.3B.3.37.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.37, the applicant described the turbine building area ventilation system. The turbine building area ventilation system provides a suitable environment for the equipment and personnel within the turbine building. The turbine building area ventilation system contains fire dampers to prevent the spread of fire.

The turbine building area ventilation system supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-34, the applicant identified the following turbine building area ventilation system component type that is within the scope of license renewal and subject to an AMR: damper housings.

2.3B.3.37.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.37 and Millstone FSAR Section 9.4.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.37.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the turbine building area ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the turbine building area ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.38 Waste Disposal Building Ventilation System

2.3B.3.38.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.38, the applicant described the waste disposal building ventilation system. The waste disposal building ventilation system provides a suitable environment for personnel access and equipment operation within the building, and minimizes the release of airborne radioactive material to the atmosphere. The system contains fire dampers to prevent the spread of fire.

The waste disposal building ventilation system provides isolation in support of the supplementary leak collection-and-release system and the auxiliary building ventilation system, and provides RG 1.97 safety-related indications. The waste disposal building ventilation system also contains environmental qualification equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a pressure boundary

In LRA Table 2.3.3-35, the applicant identified the following waste disposal building ventilation system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; and flex connections.

2.3B.3.38.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.38 and MPS Unit 2 FSAR Section 9.4.9. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.38.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the waste disposal building ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the waste disposal building ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.39 Unit 2 Fire Protection System

2.3B.3.39.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.39, the applicant described the Unit 2 fire protection system. The MPS fire protection system is a shared system that provides intended functions for both Millstone Unit 2 and Unit 3. This section addresses those portions of the fire protection system that are specifically designated as Unit 2 components. Since this is a shared system, this section is duplicated in the Millstone Unit 2 license renewal application.

The Unit 2 fire protection system provides for detection and suppression of fires such that plant equipment damage is minimized and safe shutdown of the plant can be achieved.

The Unit 2 fire protection system is comprised of fire and smoke detection components, water-based fire suppression components, and gas-based fire suppression components. The system also includes the RCP motor oil collection system components.

The Unit 2 fire protection system provides containment pressure boundary integrity. The fire protection system provides fire detection and suppression capability to protect safe shutdown or safety-related equipment, provides oil collection for the prevention of an oil fire around the RCPs, supports station blackout, provides emergency lighting, and provides backup cooling water to the EDGs in response to a fire event.

Intended functions within the scope of license renewal include the following:

- provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint)
- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow
- provides a spray pattern

In LRA Table 2.3.3-36, the applicant provided the screening results for Unit 2 fire protection system components (shared with Unit 3), identifying those components that require aging management review. Similarly, LRA Table 2.4.2-36 provides the screening results for the Unit 2 miscellaneous structural commodities. Table 2.4.2-36 includes fire barrier penetration seals and fire doors.

In LRA Table 2.3.3-36, the applicant identified the following Unit 2 fire protection system component types that are within the scope of license renewal and subject to an AMR: drip pans; fire hydrants; flame arrestors; flex connections; flow indicators; flow orifices; nozzles; pipe; pumps; RCP oil collection tanks; retard chambers; sprinkler heads; strainers; tubing; valves; and water motor gongs.

2.3B.3.39.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.39 and Millstone FSAR Section 9.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.39.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the Unit 2 fire protection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the Unit 2 fire protection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.40 Unit 3 Fire Protection System

2.3B.3.40.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.40, the applicant described the Unit 3 fire protection system. The MPS fire protection system is a shared system that provides intended functions for both Millstone Unit 2 and Unit 3. This section addresses those portions of the fire protection system that are specifically designated as Unit 3 components. Since this is a shared system, this section is duplicated in the Millstone Unit 2 license renewal application.

The Unit 3 Fire protection system provides for detection and suppression of fires such that plant equipment damage is minimized and safe shutdown of the plant can be achieved.

The Unit 3 fire protection system is comprised of fire and smoke detection components, water-based fire suppression components, and gas-based fire suppression components. The system also includes the RCP motor oil collection system components.

The Unit 3 fire protection system provides containment pressure boundary integrity, RG 1.97 safety-related indications, and pressure relief for tornado protection in the cable spreading area. The Unit 3 fire protection system also provides fire detection and suppression capability to protect safe shutdown or safety-related equipment, provides oil collection for the prevention of an oil fire around the RCPs, supports station blackout, and contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides for heat transfer
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint)
- provides filtration
- provides a spray pattern
- restricts flow

- provides for vortex suppression

In LRA Table 2.3.3-37 the applicant provided the screening results for Unit 3 fire protection system components, identifying those components that require aging management review. Similarly, LRA Table 2.4.2-36 provides the screening results for the Unit 3 miscellaneous structural commodities. Table 2.4.2-36 includes fire barrier penetration seals and fire doors.

In LRA Table 2.3.3-37, the applicant identified the following Unit 3 fire protection system component types that are within the scope of license renewal and subject to an AMR: CO_2 storage tank; CO_2 tank cooling coils; compressed air cylinders; compressed halon cylinders; coolant heat exchanger; damper housings; diesel fuel storage tank; drip pans; ductwork; exhaust silencer; expansion tank overflow container; fan/blower housings; filter/strainers; fire hydrants; fire protection RCP oil collection tanks; fire water storage tank; flame arrestors; flex connections; flexible hoses; flow indicatiors; flow switches; heater unit; hydropneumatic tank; instrument snubbers; level indicators; lube oil cooler; nozzles; odorizers; oil mist recovery unit; oil reservoirs; pipe; pumps; restricting orifices; self contained breathing apparatus; sprinkler heads; tubing; vacuum limiter; valves; vortex breaker assembly; water cooled exhaust manifold; and water manifold.

2.3B.3.40.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.40 and Millstone FSAR Section 9.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.40.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the Unit 3 fire protection system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the Unit 3 fire protection system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.41 Domestic Water System

2.3B.3.41.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.41, the applicant described the domestic water system. The purpose of the domestic water system is to provide potable water for various uses, including make-up water to the fire water storage tanks, and back-up cooling for the instrument air compressors. The domestic water system is supplied by the public water system from the town of Waterford, Connecticut.

The domestic water system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The domestic water system also provides makeup water to the fire water storage tanks and cooling water flow to the instrument air compressor that is credited for fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-38, the applicant identified the following domestic water system component types that are within the scope of license renewal and subject to an AMR: flow indicator; heater; pipe; shock absorbers; strainers; and valves.

2.3B.3.41.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.41 and Millstone FSAR Section 9.2.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.41 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the domestic water system shows that backflow preventors are within the scope of license renewal and subject to an AMR. However, component type “backflow preventor” is not listed in LRA Table 2.3.3-38 as a component type with intended functions. In RAI 2.3.3.41-1B, dated June 9, 2004, the staff requested the applicant to explain whether these components were included with another component type or to explain their exclusion from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the subject backflow preventors are within the scope of license renewal and are included in the component type, “Valves,” in LRA Table 2.3.3-38.

In its review, the staff finds the applicant’s response to 2.3.3.41-1B acceptable based on inclusion of the component.

In its review, the staff also noted that a license renewal drawing for the domestic water system indicates that showers are within the scope of the license renewal and subject to an AMR. However, component type “shower” is not listed in LRA Table 2.3.3-38 as a component type with intended functions. In RAI 2.3.3.41-2B, dated June 9, 2004, the staff requested the applicant to explain whether these components were included with another component type or to explain their exclusion from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the subject showers shown are within the scope of license renewal and are included in the component type, “Pipe,” in LRA Table 2.3.3-38.

In its review, the staff finds the applicant’s response to RAI 2.3.3.4-2B acceptable based on inclusion of the component.

2.3B.3.41.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the domestic water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the domestic water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.42 Emergency Diesel Generator System

2.3B.3.42.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.42, the applicant described the emergency diesel generator system. The purpose of the emergency diesel generator (EDG) system is to provide a dependable on-site AC power source capable of automatically starting and supplying the loads necessary to safely shutdown the plant and maintain it in a safe shutdown condition.

The EDG system is comprised of two identical EDGs. Each EDG supplies 4160 vac power to its respective emergency bus. The EDG system includes the starting air subsystem, lubricating oil subsystem, cooling water subsystem, and the combustion air intake and exhaust subsystem.

The EDG system provides a reliable source of emergency power for the required loads and providing RG 1.97 safety-related indications. The EDG system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The EDG system supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides for heat transfer

- provides limited structural integrity
- provides filtration
- restricts flow

In LRA Table 2.3.3-39, the applicant identified the following EDG system component types that are within the scope of license renewal and subject to an AMR: air distributors; air receiver tanks; air tanks; crankcase vacuum manometers; diesel engine jacket water cooler heat exchangers; engine air cooler water heat exchangers; engine sumps; expansion joints; filter/strainers; fresh water expansion tanks; governor lube oil coolers; jacket water heaters; level indicators; lube oil heat exchangers; oil reservoirs; oil separators; pipe; pre-lube oil heaters; pumps; restricting orifices; servo fuel rack shutdown and starting boosters; silencers; tubing; turbo chargers; and valves.

2.3B.3.42.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.42 and Millstone FSAR Sections 8.3.1, 9.5.5, 9.5.6, 9.5.7, and 9.5.8. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.B3.3.42.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the EDG system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the EDG system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.43 Emergency Diesel Generator Fuel Oil System

2.3B.3.43.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.43, the applicant described the EDG fuel oil system. The EDG fuel oil system provides fuel oil to the diesel engine cylinders. The EDG fuel oil system includes fuel oil tanks, transfer pumps, strainers, piping, and valves.

The EDG fuel oil system provides adequate fuel oil to support the safety function of the diesel generators. The EDG fuel oil system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The EDG fuel oil system supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint)
- provides limited structural integrity
- provides filtration
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow

In LRA Table 2.3.3-40, the applicant identified the following EDG fuel oil system component types that are within the scope of license renewal and subject to an AMR: accumulator tanks; drip pans; filter/strainers; flame arrestors; flow elements; fuel oil day tanks; fuel oil storage tanks; injectors; pipe; pumps; restricting orifices; tubing; and valves.

2.3B.3.43.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.43 and Millstone FSAR Section 9.5.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.43 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the Millstone FSAR states that backflow prevention devices preclude oil backing up out of the floor drains in the event of a day tank rupture. These devices are not shown on license renewal drawings for the EDG fuel oil system and are not listed in LRA Table 2.3.3-40 as components requiring an AMR. In RAI 2.3.3.43-1B, dated June 9, 2004, the staff requested the applicant to explain whether these components were included with another component type or to explain their exclusion from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the subject backflow prevention devices are located in the diesel generator room floor drains to prevent the backflow of combustible liquids to safety-related areas through the interconnected drain systems. The backflow devices are part of the sanitary water system. Upon further review, the applicant concluded that the backflow prevention devices should be included within the scope of license renewal, since these components support fire protection and the sanitary water system should include an intended function that meets the criteria of 10 CFR 54.4(a)(3) for fire protection. The carbon steel backflow prevention devices are included in the component type, "Valves," in LRA Table 2.3.3-50.

In its review, the staff finds the applicant’s response to RAI 2.3.3.43-1B acceptable based on inclusion of the component.

Another license renewal drawing for the EDG fuel oil system shows dewatering boxes excluded from scope and not subject to an AMR. Additionally, sump and water pumping connections are shown not to be subject to an AMR. In order for the staff to complete its review, more information was necessary to ensure that all the components performing the system-level intended functions were included within the scope of license renewal. In RAI 2.3.3.43-2B, dated June 9, 2004, the staff requested the applicant to supply the FSAR references that describe these components, or provide a summary description of their functions including any intended functions.

In its response, dated July 26, 2004, the applicant stated that the Millstone FSAR does not contain a description of the dewatering boxes. The dewatering boxes shown on the license renewal drawing for the EDG fuel oil system are used to remove water that accumulates inside each fuel oil storage tank. The dewatering tank and its components were not highlighted on the license renewal drawing. The tank well, tank well pipe, and tank well pipe cap were evaluated as an integral part of the "Fuel Oil Storage Tank" shown in LRA Table 2.3.3-40.

In its review, the staff finds the applicant’s response to RAI 2.3.3.43-2B acceptable based on inclusion of the component.

2.3B.3.43.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the EDG fuel oil system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the EDG fuel oil system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.44 Station Blackout Diesel Generator System

2.3B.3.44.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.44, the applicant described the station blackout (SBO) diesel generator system. The Millstone SBO diesel generator system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared system, this section is duplicated in the Millstone Unit 2 license renewal application.

The purpose of the SBO diesel generator system, installed in response to 10 CFR 50.63, is to provide an alternate AC power source to either the Millstone Unit 2 or Unit 3 emergency bus. The SBO diesel generator system consists of the diesel generator and includes the lubricating oil subsystem, engine cooling subsystem, air intake and exhaust subsystem, fuel oil subsystem, and starting air subsystem.

The SBO diesel generator system supports station blackout and fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- restricts flow

In LRA Table 2.3.3-41, the applicant identified the following SBO diesel generator system component types that are within the scope of license renewal and subject to an AMR: aftercoolers; air receivers; aspirators; expansion joints; expansion tanks; filter/strainers; flame arrestors; flow indicators; fuel heaters; fuel oil day tanks; fuel oil storage tanks; immersion heaters; injectors; lube oil coolers; lubricators; oil sumps; pipe; pulsation dampeners; pumps; radiators; restricting orifices; silencers; tubing; turbo chargers; upper and lower air start motors; and valves.

2.3B.3.44.2 Staff Evaluation

The Millstone SBO diesel generator system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. The staff reviewed the Millstone Unit 3 LRA Section 2.3.3.44, Millstone Unit 2 FSAR Section 1.2.9, and Millstone Unit 3 FSAR Section 8.3.1. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.44 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the SBO diesel generator system shows a 28-inch exhaust rain cap to be subject to an AMR. The rain cap appears to provide a pressure boundary function. Millstone Unit 2 LRA Table 2.3.3-36 and Millstone Unit 3 LRA Table 2.3.3-41 do not list the rain cap as a component type requiring an AMR. In RAI 2.3.3.44-1B, dated June 9, 2004, the staff requested the applicant to explain whether the rain cap was included with another component type or to explain its exclusion.

In its response, dated July 26, 2004, the applicant stated that the subject rain cap, shown on the SBO diesel generator system license renewal drawing, is an integral part of the exhaust silencer. The exhaust silencer with the integral rain cap is within the scope of license renewal and included in the component type, "Silencers," in Unit 2 LRA Table 2.3.3-36 and Unit 3 LRA Table 2.3.3-41.

The staff finds the applicant's response to RAI 2.3.3.44-1B acceptable, based on inclusion of the component.

The Millstone Unit 3 FSAR states that all safety-related lines or valves, which are subject to freezing, are electrically heat-traced and insulated. A license renewal drawing for the station blackout fuel oil system shows a line going from the fuel oil storage tank to the fuel oil day tank that is within the scope of license renewal. It appears that the line in question is insulated. Thermal insulation is not listed as within the scope of license renewal and subject to an AMR for any Unit 2 or Unit 3 systems; nor is it discussed in the Unit 2 or Unit 3 Millstone Unit 3 LRA. In RAI 2.3.3.44-2B, June 9, 2004, the staff requested the applicant to explain the apparent exclusion of pipe insulation.

In its response, dated July 26, 2004, the applicant stated that the subject fuel line is heat traced and thermally insulated. This insulation does not perform an intended function since the effectiveness of the heat trace system on the fuel temperatures in the subject fuel line and fuel tank is monitored. In the event of low fuel temperatures, a heat trace trouble alarm is activated in the control room. Insulation-related problems would be rapidly identified and repaired. Therefore, the thermal insulation is not within the scope of license renewal.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.44-2B acceptable based on operator actions respond to a heat-trace trouble alarm and initiate the subsequent corrective actions. The ability of the system's temperature monitoring instrumentation to localize a low temperature along the length of the piping would allow differentiation between thermal insulation or heat-trace circuit problems. Therefore, the cause of the trouble alarm would be localized such that identification and appropriate repair would be made before loss of system-level intended function would occur. Therefore, the staff's concern described in RAI 2.3.3.44-2B is resolved.

2.3B.3.44.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the SBO diesel generator system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the SBO diesel generator system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.45 Security System

2.3B.3.45.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.45, the applicant described the security system. The Millstone security system is a shared system that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared system, this section is duplicated in the Millstone Unit 2 license renewal application.

Security system lighting provides illumination for operator access routes required in response to fire protection events. The security system diesel generator provides back-up electrical power for plant security features including security perimeter lighting. The security system includes the lubricating oil subsystem, engine cooling subsystem, fuel oil subsystem, and the air intake and exhaust subsystem that support the security diesel generator.

The security system provides yard lighting, and back-up electrical power for yard lighting, in support of fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides filtration

In LRA Table 2.3.3-42, the applicant identified the following security system component types that are within the scope of license renewal and subject to an AMR: coolers; diesel fuel oil storage tank; fan/blower housings; filter/strainers; heaters; oil pans; pipe; pumps; radiators; tubing; and valves.

2.3B.3.45.2 Staff Evaluation

The staff reviewed the Millstone Unit 3 LRA Section 2.3.3.45. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.B3.3.45.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its

review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the security system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the security system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.46 Boron Recovery System

2.3B.3.46.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.46, the applicant described the boron recovery system. The boron recovery system receives reactor coolant letdown from the CVCS that has been degasified in the radioactive gaseous waste system. The liquid entering the boron recovery system is produced by the feed and bleed operations necessary to maintain the boron concentration in the reactor coolant at the desired level.

The boron recovery system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The boron recovery system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-43, the applicant identified the following boron recovery system component types that are within the scope of license renewal and subject to an AMR: bolting; boron recovery tanks; cesium-removal ion exchangers; filter/strainers; pipe; tubing; and valves.

2.3B.3.46 Staff Evaluation

The staff reviewed LRA Section 2.3.3.46 and Millstone FSAR Section 9.3.5. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.46.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the boron recovery system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the boron recovery system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.47 Radioactive Liquid Waste Processing System

2.3B.3.47.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.47, the applicant described the radioactive liquid waste processing system. The radioactive liquid waste processing system collects, stores, processes, recycles, and disposes of liquid radioactive waste.

The radioactive liquid waste processing system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-44, the applicant identified the following radioactive liquid waste processing system component types that are within the scope of license renewal and subject to an AMR: bolting; flow elements; pipe; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the radioactive liquid waste processing system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the radioactive liquid waste processing system:

- pumps
- radiation detectors
- tubing

2.3B.3.47.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.47 and Millstone FSAR Section 11.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant’s responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the boron recovery system is acceptable.

2.3B.3.47.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the liquid waste processing system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the liquid waste processing system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.48 Radioactive Gaseous Waste System

2.3B.3.48.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.48, the applicant described the radioactive gaseous waste system. The radioactive gaseous waste system processes and controls the release of potentially radioactive waste gases.

The radioactive gaseous waste system provides pressure boundary integrity and isolation for the containment, and by providing RG 1.97 safety-related indications. The radioactive gaseous waste system provides a pressure boundary for interfacing systems and since the system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The radioactive gaseous waste system also supports fire protection and contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity

In LRA Table 2.3.3-45, the applicant identified the following radioactive gaseous waste system component types that are within the scope of license renewal and subject to an AMR: damper housings; ductwork; pipe; process vent cooler; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the radioactive gaseous waste system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the radioactive gaseous waste system:

- degasifier feed preheater
- degasifiers
- degasifier condenser

- tubing

2.3B.3.48.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.48 and Millstone FSAR Section 11.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the radioactive gaseous waste system is acceptable.

2.3B.3.48.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the radioactive gaseous waste system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the radioactive gaseous waste system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.49 Post-Accident Sampling System

2.3B.3.49.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.49, the applicant described the post-accident sampling system. The post-accident sampling system is designed to obtain samples of the reactor coolant, the containment sump fluid, and the containment atmosphere under accident conditions. The post-accident sampling system includes the containment hydrogen analyzers.

The post-accident sampling system provides the capability to obtain a post-accident sample of the containment atmosphere and the primary coolant, providing pressure boundary integrity and isolation for the containment and interfacing safety-related systems, and providing RG 1.97 safety-related indications. The post-accident sampling system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The post-accident sampling system also contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides limited structural integrity
- provides filtration
- provides for heat transfer

In LRA Table 2.3.3-46, the applicant identified the following post-accident sampling system component types that are within the scope of license renewal and subject to an AMR: accumulators; bolting; de-ionized water flush tank; drain tanks; filter/strainers; flow elements; hoses; hydrogen sensors; hydrogen tanks; pipe; pumps; restricting orifices; sample coolers; sample cylinders/chambers; tubing; and valves.

2.3B.3.49.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.49 and Millstone FSAR Section 9.3.2.6. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.3.49.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the post-accident sampling system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the post-accident sampling system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.50 Radioactive Solid Waste System

2.3B.3.50.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.50, the applicant described the radioactive solid waste system. The radioactive solid waste system is designed to collect, dewater, package, and temporarily store solid radioactive waste materials prior to shipment offsite and ultimate disposal.

The radioactive solid waste system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The radioactive solid waste system also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-47, the applicant identified the following radioactive solid waste system component types that are within the scope of license renewal and subject to an AMR: bolting; pipe; and valves.

2.3B.3.50.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.50 and Millstone FSAR Section 11.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.B3.3.50.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the radioactive solid waste system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the radioactive solid waste system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.51 Reactor Plant Aerated Drains System

2.3B.3.51.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.51, the applicant described the reactor plant aerated drains system. The reactor plant aerated drains system collects potentially contaminated effluent from sumps located inside the containment, ESF building, auxiliary building, pipe tunnel, fuel building, waste disposal building, and turbine building. The collected effluent is discharged to the radioactive liquid waste processing system for processing and disposal.

The reactor plant aerated drains system provides containment pressure boundary integrity, collection and removal of groundwater from the ESF building underdrains and porous concrete, prevention of backflow of the SW pump cubicles drains, a means to detect flooding due to leakage from emergency core cooling system components, RG 1.97 safety-related indications, and a supplemental leak collection-and-release system boundary in the ESF building. The reactor plant aerated drains system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The reactor plant aerated drains system also contains environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary
- restricts flow

In LRA Table 2.3.3-48, the applicant identified the following reactor plant aerated drains system component types that are within the scope of license renewal and subject to an AMR: expansion joints; filter/strainers; flow elements; flow indicators; groundwater sump; pipe; pumps; restricting orifices; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the plant aerated drains system. In its December 3, 2004, RAI response, the applicant identified the groundwater underdrains storage tank component type that was added to the scope of the plant aerated drains system.

2.3B.3.51.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.51, the November 9, 2004, response, and Millstone FSAR Sections 3.8.1 and 9.3.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant’s responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant’s December 3, 2004, response related to the scoping and screening results of the reactor plant aerated drains system is acceptable.

2.3B.3.51.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor plant aerated drains system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor plant aerated drains system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.52 Reactor Plant Gaseous Drains System

2.3B.3.52.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.52, the applicant described the reactor plant gaseous drains system. The reactor plant gaseous drains system collects primary coolant drains and hydrogenated liquids from valve and pump leakoffs, and other equipment.

The reactor plant gaseous drains system provides containment pressure boundary integrity and RG 1.97 safety-related indications. The reactor plant gaseous drains system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The reactor plant gaseous drains system also contains environmental qualification components and supports station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-49, the applicant identified the following reactor plant gaseous drains system component types that are within the scope of license renewal and subject to an AMR: bolting; flow indicators; pipe; pumps; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the reactor plant gaseous drains system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the reactor plant gaseous drains system:

- containment drains transfer tank
- primary drains transfer tank

2.3B.3.52.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.52 and Millstone FSAR Section 9.3.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.52 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the reactor plant gaseous drains system shows containment drains transfer tanks excluded from the scope of license renewal. These tanks serve pressure boundary and limited structural support intended functions and should be included within the scope of license renewal. In RAI 2.3.3.52-1B, dated June 9, 2004, the staff requested the applicant to explain why the transfer tanks in the reactor plant gaseous drains system were excluded from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the NSR primary drains transfer tank and the NSR containment drains transfer tank are located on the lowest level of the structures that house them and neither is in the immediate vicinity of any safety-related equipment. Additionally, neither tank operates at an elevated pressure. Consequently, the primary drains transfer tank and the containment drains transfer tank are not within the scope of license renewal, since they do not meet the criteria for pressure boundary or limited structural integrity defined in Section 2.1.3.6 of the LRA. The lines attached to these tanks, however, are within the scope of license renewal because they traverse into areas that do contain safety-related equipment.

The staff finds the applicant's response to RAI 2.3.3.52-1B acceptable because the applicant adequately explained that the primary drains transfer tank and the containment drains transfer tank do not present a potential for spatially interacting with safety-related SSCs, nor do they functionally support any system-level intended functions. The staff concludes that the primary drains transfer tank and the containment drains transfer tank were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff's concern described in RAI 2.3.3.52-1B is resolved.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the reactor plant gaseous drains system is acceptable.

2.3B.3.52.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor plant gaseous drains system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor plant gaseous drains system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.3.53 Sanitary Water System

2.3B.3.53.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.53, the applicant described the sanitary water system. The sanitary water system collects drainage from sanitary components and directs non-radioactively contaminated drainage to the public sewer system. The sanitary water system directs potentially contaminated drainage to a contaminated sump for further transfer to the radioactive liquid waste processing system.

The sanitary water system contains NSR components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.3-50, the applicant identified the following sanitary water system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

2.3B.3.53.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.53 and Millstone FSAR Section 9.2.4. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.3.53 identified areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

The FSAR states that portions of the domestic and sanitary water systems in the control building are seismically supported, to assure that the failure of the piping will not cause a loss of positive pressure in the control building. A license renewal drawing shows sanitary water system piping running from floor drains excluded from the scope of license renewal. Sanitary system piping running through the control building from roof drains is also shown as not being within the scope of license renewal. Failure of this piping could cause the sanitary water system to fail to maintain positive pressure in the control building, whether or not seismic support is required. The subject piping should be included within the scope of license renewal because it performs a pressure boundary intended function. In RAI 2.3.3.53-1B, dated June 9, 2004, the staff requested the applicant to confirm that the piping in the domestic and sanitary water system does not perform system intended functions that would necessitate its inclusion within the scope of license renewal.

In its response, dated July 26, 2004, the applicant stated that the sanitary water floor drains and piping license renewal drawings for the sanitary water system are in the mechanical room portion of the control building and have drain traps (loop seals) installed. These drain traps are located directly below the drain opening, but are not shown on the license renewal drawing. The drain traps are currently within the scope of license renewal as part of the control building pressure boundary and are included in the component type, "Pipe," in LRA Table 2.3.3-50. The drain line pipe downstream of the drain traps is embedded in concrete and does not perform the function of maintaining a positive pressure in the control building. There is effectively no upstream piping associated with these drain traps. The roof drains shown on the license renewal drawing, are embedded in the ceiling and walls of the control building and do not penetrate into the control building pressure boundary. Since failure of the piping shown on the license renewal drawing, associated with the floor drains, and of the roof drain piping, will not cause a loss of positive pressure in the control building, the applicant stated that this piping is not the subject of the discussion in FSAR Section 9.2.4.3 and is not within the scope of license renewal.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.53-1B acceptable because the applicant adequately explained that the drain lines are embedded in concrete such that their failure would not affect the pressure boundary of the control building. The discussion in the FSAR does not describe the embedded piping which has no intended functions. Additionally, there is adequate explanation that the drain traps are associated with exposed drains are within the scope of license renewal and included in Table 2.3.3-50. The staff concludes that the drain lines associated with the sanitary water system were scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.53-1B is resolved.

A license renewal drawing for the sanitary water system shows a line to be within the scope of license renewal that is indicated to continue onto another license renewal drawing where it is stated that the subject line provides continuous drip for maintaining the house trap seal, which is shown to be within the scope of license renewal. From the drawings it does not appear that the subject line connects directly to the running trap. To maintain the trap seal, lines that carry the flow to the “in-scope” trap, should be included within the scope of license renewal. In RAI 2.3.3.53-2B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of these lines.

In its response, dated July 26, 2004, the applicant stated that the drain line on the license renewal drawing was inadvertently highlighted and is not within the scope of license renewal. The drain trap shown on the license renewal drawing is within the scope of license renewal since it is the only component necessary to maintain the negative pressure envelope in the main steam valve house as part of the supplementary leak collection-and-release system boundary (which is further described in main steam valve building ventilation system). The in-scope drain trap is included in the component type, “Pipe,” in LRA Table 2.3.3-50.

Based on its review, the staff finds the applicant’s response to RAI 2.3.3.53-2B acceptable because the applicant clarified that the drain line was inadvertently highlighted and is not within the scope of license renewal, and that the drain trap was scoped in accordance with the requirements of 10 CFR 54.4(a) and screened in accordance with the requirements of 10 CFR 54.21(a)(1). Therefore, the staff’s concern described in RAI 2.3.3.53-1B is resolved.

2.3B.3.53.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the sanitary water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the sanitary water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4 Steam and Power Conversion Systems

In LRA Section 2.3.4, the applicant identified the structures and components of the steam and power conversion systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the steam and power conversion systems in the following sections of the LRA:

- 2.3.4.1 main steam system
- 2.3.4.2 feedwater system
- 2.3.4.3 condensate make-up and draw-off system
- 2.3.4.4 steam generator blowdown system
- 2.3.4.5 auxiliary feedwater system
- 2.3.4.6 auxiliary steam system
- 2.3.4.7 auxiliary boiler condensate and feedwater system
- 2.3.4.8 hot water heating system
- 2.3.4.9 hot water pre-heating system
- 2.3.4.10 steam generator chemical addition system
- 2.3.4.11 turbine plant miscellaneous drains system

The corresponding subsections of this SER (2.3B.4.1 - 2.3B.4.11, respectively) present the staff’s related review findings.

2.3B.4.1 Main Steam System

2.3B.4.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.1, the applicant described the main steam system. The main steam system transports steam from the steam generators to the turbine-generator. This system also provides a means of controlled heat release from the nuclear steam supply system during periods of station electrical load rejection or when the condenser is not available. The system provides steam for various auxiliary services including the steam generator auxiliary feedwater pump turbine, turbine gland sealing, and auxiliary steam.

The main steam system provides a steam flow path to remove heat from the RCS, overpressure protection for the steam generators, steam to the steam generator auxiliary feedwater pump turbine, isolation at system interfaces, containment pressure boundary integrity, and RG 1.97 safety-related indications. The main steam system also prevents uncontrolled blowdown of more than one steam generator following a main steam line break (MSLB), limits the maximum steam flow rate from a faulted steam generator, and provides steam generator isolation and RCS heat removal in the event of a high-energy line break (HELB) outside containment. The main steam system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also includes environmental qualification components and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-1, the applicant identified the following main steam system component types that are within the scope of license renewal and subject to an AMR: expansion joints; flexible hoses; flow elements; pipe; steam traps; tubing; and valves.

2.3B.4.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.1 and Millstone FSAR Sections 7.1.2.5, 7.3.2, 10.3, and 15.0. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.4.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an

AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the main steam system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the main steam system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.2 Feedwater System

2.3B.4.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.2, the applicant described the feedwater system. The feedwater system heats and supplies condensate-quality water to the secondary-side of the steam generators to support heat removal from the RCS. A portion of the system provides the flowpath for auxiliary feedwater flow to the steam generators.

The feedwater system provides a flow path for auxiliary feedwater to the steam generators, isolation of feedwater flow in response to an MSLB accident, steam generator isolation and auxiliary feedwater flowpath in response to a HELB outside containment, containment pressure boundary integrity, and RG 1.97 safety-related indications. The feedwater system provides NSR signals to the plant process computer for calorimetric calculations. The system contains environmental qualification components and supports fire protection and station blackout.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.4-2, the applicant identified the following feedwater system component types that are within the scope of license renewal and subject to an AMR: control blocks, flow elements; hydraulic reservoirs; nitrogen accumulators; pipe; tubing; and valves.

2.3B.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.2 and Millstone FSAR Sections 7.1.2.5, 10.4.7, 15.1, and 15.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.4.2 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the feedwater system indicates that a portion of the feedwater system is continued on another license renewal drawing. However, this drawing is not included in the LRA. Additionally, LRA Section 2.3.4.2 states that “the evaluation boundary begins at the feedwater flow elements” but does not identify the particular elements to which the LRA refers. In RAI 2.3.4.2-1B, dated June 9, 2004, the staff requested the applicant to supply the drawing that contained the remainder of the feedwater system or to describe the portions of the system that are not shown on a license renewal drawing, such as the flow elements.

In its response, dated July 26, 2004, the applicant stated that the feedwater system license renewal boundary begins at the subject flow elements shown on license renewal drawings for the feedwater system. The flow elements are FE-48A, -48B, -48C, and -48D. There are no feedwater system components within the scope of license renewal on other drawings.

Based on its review, the staff finds the applicant's response to RAI 2.3.4.2-1B acceptable, because the applicant adequately explained that the system evaluation boundary for the feedwater system begins at flow elements FE-48A, -48B, -48C, and -48D shown on the license renewal drawings and that no other feedwater system components within the scope of license renewal exist on other drawings. Therefore, the staff's concern described in RAI 2.3.4.2-1B is resolved.

2.3B.4.2.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.3 Condensate Make-Up and Draw-Off System

2.3B.4.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.3, the applicant described the condensate make-up and draw-off system. The condensate make-up and draw-off system supplies make-up water to various plant systems, including condensate and feedwater.

The condensate make-up and draw-off system supports fire protection.

The intended function within the scope of license renewal includes providing a pressure boundary.

In LRA Table 2.3.4-3, the applicant identified the following condensate make-up and draw-off system component types that are within the scope of license renewal and subject to an AMR: condensate storage tank; pipe; rupture disk; tubing; and valves.

2.3B.4.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.3 and Millstone FSAR Sections 10.3.5, 10.4.7.2, and 10.4.8. The staff's review, using the evaluation methodology described in Section 2.3 of this

SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.4.3 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff stated that the FSAR states that a recirculation heating subsystem is provided for the condensate storage tank to maintain a minimum water temperature of 40°F and thus prevent freezing of tank inventory. The components of this subsystem are located outside of the condensate storage tank in the yard and are heat-traced to prevent freezing. A license renewal drawing for the condensate make-up and draw-off system shows that the components downstream of valves isolating the recirculating heating system from the condensate storage tank are not within the scope of license renewal. The condensate make-up and draw-off system is within the scope of license renewal because the condensate storage tank provides a backup supply of water to the auxiliary feedwater pumps. Ice in the condensate storage tank has the potential of blocking flow to the auxiliary feedwater pumps. In RAI 2.3.4.3-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the condensate storage tank recirculation heating system piping from the scope of license renewal and from being subject to an AMR.

In its response, dated June, 9, 2004, the applicant stated that the condensate storage tank is an NSR tank and is within the scope of license renewal to support operation of the auxiliary feedwater pumps during an Appendix R fire event. Although the condensate storage tank is provided with a recirculation heating subsystem, the installed low-temperature alarm and associated actions initiated in response to the alarm, together with the thermal inertia associated with such a large tank, provide assurance that freezing of the tank contents will not occur. Therefore, the condensate storage tank recirculation heating subsystem is not required for the tank to perform its intended function and is not within the scope of license renewal.

In its review, the staff finds the applicant's response to RAI 2.3.4.3-1B acceptable based on the explanation for exclusion of the component.

2.3B.4.3.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the condensate make-up and draw-off system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the condensate make-up and draw-off system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.4 Steam Generator Blowdown System

2.3B.4.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.4, the applicant described the steam generator blowdown system. The steam generator blowdown system is used in conjunction with the condensate demineralizer, chemical addition, and sample systems to control the chemistry of the steam generator shell side water. Steam generator blowdown system flow is automatically isolated upon indications of a steam generator tube leak or an event requiring conservation of steam generator secondary-side inventory.

The steam generator blowdown system provides isolation at system interfaces, automatic isolation of steam generator blowdown flow, containment pressure boundary integrity, and RG 1.97 safety-related indications. The steam generator blowdown system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also includes environmental qualification components and supports fire protection and anticipated transient without scram.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-4, the applicant identified the following steam generator blowdown system component types that are within the scope of license renewal and subject to an AMR: flow elements; pipe; pumps; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the steam generator blowdown system. In its December 3, 2004, RAI response, the applicant identified the steam generator blowdown tank component type that was added to the scope of the steam generator blowdown system.

2.3B.4.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.4 and Millstone FSAR Sections 7.1.2.5, 10.4.7, 15.1, and 15.2. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.4.4 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that a license renewal drawing for the steam generator blowdown system shows the license renewal boundary ending at isolation valves for sample lines and components associated with a skid-mounted radiation monitor. The radiation monitor provides one of the signals that affect steam generator blowdown system isolation, and lines and components upstream of the monitor have a pressure boundary intended function. In RAI 2.3.4.4-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the radiation monitoring and sample lines and components from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the isolation of steam generator blowdown flow in response to a steam generator blowdown sample monitor signal is not a license renewal intended function as defined in 10 CFR 54.4(a). Failure to automatically isolate the flow of steam generator blowdown effluent with increased activity levels would not prevent safe shutdown of the reactor or challenge the offsite dose limits of 10 CFR 100. Therefore, the applicant concluded that the steam generator blowdown sample monitor and associated components are not within the scope of license renewal.

The staff finds the applicant's response to RAI 2.3.4.4-1B acceptable, because the applicant adequately explained exclusion of the component.

The staff also reviewed the results of the scoping methodology changes, set forth in responses to RAI 2.1-1, that are described in the applicant's responses dated November 9, 2004, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the steam generator blowdown system is acceptable.

2.3B.4.4.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the steam generator blowdown system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the steam generator blowdown system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.5 Auxiliary Feedwater System

2.3B.4.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.5, the applicant described the auxiliary feedwater system. The auxiliary feedwater system provides a supply of feedwater to the secondary-side of the steam generators for RCS heat removal if normal feedwater flow is unavailable. The system consists of two motor-driven pumps powered from the emergency busses, and a steam turbine-driven pump that provides feedwater flow upon a loss of all AC power. The auxiliary feedwater system includes the demineralized water storage tank that provides a missile-protected source of water to the auxiliary feedwater pumps. Emergency make-up to the tank can be provided from domestic water via removable spool pieces. Additionally, the SW system can provide an alternate source of water to the pumps through removable spool pieces.

The auxiliary feedwater system provides feedwater to the steam generators for removal of sensible and decay heat from the RCS, isolation of auxiliary feedwater flow to a faulted or ruptured steam generator, auxiliary feedwater flow limitation to prevent pump runout, feedwater flow and steam generator isolation in response to a high-energy line break outside containment, containment pressure boundary integrity, and RG 1.97 safety-related indications. The auxiliary feedwater system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification components and supports fire protection, anticipated transient without scram, and station blackout.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- restricts flow
- provides limited structural integrity

In LRA Table 2.3.4-5, the applicant identified the following auxiliary feedwater system component types that are within the scope of license renewal and subject to an AMR: auxiliary feedwater (AFW) pump oil coolers; cavitating venturies; demineralized water storage tank; flow elements; level indicators; lube oil filters; oil reservoirs; pipe; pumps; restricting orifices; spool pieces; strainers; tubing; turbine casings; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the auxiliary feedwater system. In its December 3, 2004, RAI response, the applicant identified the demineralized water storage tank (DWST) heater component type that was added to the scope of the auxiliary feedwater system.

2.3B.4.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.5 and Millstone FSAR Sections 7.3.1 and 10.4.9. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended

functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff also reviewed the results of the scoping methodology changes, set forth in responses to 04, and December 3, 2004. The staff finds the expanded scope of mechanical components identified in the December 3, 2004, response acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the auxiliary feeder system is acceptable.

2.3B.4.5.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the auxiliary feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the auxiliary feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.6 Auxiliary Steam System

2.3B.4.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.6, the applicant described the auxiliary steam system. The auxiliary steam system supplies steam to various heating and processing equipment during normal plant operations.

The auxiliary steam system provides isolation in the event of a HELB. The auxiliary steam system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also provides environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-6, the applicant identified the following auxiliary steam system component types that are within the scope of license renewal and subject to an AMR: pipe; tubing; and valves.

2.3B.4.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.6 and Millstone FSAR Section 10.4.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.4.6.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the auxiliary steam system provides components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the auxiliary steam system provides components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.7 Auxiliary Boiler Condensate and Feedwater System

2.3B.4.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.7, the applicant described the auxiliary boiler condensate and feedwater system. The auxiliary boiler condensate and feedwater system provides condensate to the auxiliary boiler for the generation of auxiliary steam when the main steam system is not available.

The auxiliary boiler condensate and feedwater system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-7, the applicant identified the following auxiliary boiler condensate and feedwater system component types that are within the scope of license renewal and subject to an AMR: auxiliary condensate cooler; auxiliary condensate flash tank; auxiliary condensate tank; level indicators; pipe; pumps; restricting orifices; sample coolers; steam traps; strainers; tubing; and valves.

As a result of the scoping methodology changes made in response to RAI 2.1-1, the applicant expanded the system boundaries for the auxiliary boiler condensate and feedwater system. In its December 3, 2004, RAI response, the applicant identified the following component types that were added to the scope of the auxiliary boiler condensate and feedwater system:

- flow elements
- radiation detectors

2.3B.4.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.7 and Millstone FSAR Section 10.4.10. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.4.7 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the LRA Table 2.3.4.7 lists “Level Indicators” as a component type subject to an AMR. A license renewal drawing for the auxiliary boiler condensate and feedwater system shows a level-observation glass for the auxiliary condensate tank as within the scope of license renewal. However, a different level-observation glass for the auxiliary condensate flash tank is shown not within the scope of license renewal. Since the line in which this component is installed is shown to be within the scope of license renewal, this results in a discontinuity of the pressure boundary. In RAI 2.3.4.7-1B, dated June 9, 2004, the staff requested the applicant to explain the apparent exclusion of the level-observation glass for the auxiliary condensate flash tank from the scope of license renewal and from being subject to an AMR.

In its response, dated July 26, 2004, the applicant stated that the level-observation glass for the auxiliary condensate flash tank is within the scope of license renewal but was inadvertently not highlighted on the license renewal drawing. The level-observation glass is included in the existing component type, “Level Indicators,” in LRA Table 2.3.4-7.

The staff finds the applicant’s response to RAI 2.3.4.7-1B acceptable based on inclusion of the component.

The staff also reviewed the results of the scoping methodology changes, due to response to RAI 2.1-1, that are described in the applicant’s responses dated November 9, 2004, and December 3, 2004. The staff finds the auxiliary boiler condensate and feedwater system expanded scope of mechanical components identified in of the December 3, 2004, response acceptable, because the applicant adequately included the NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) with spatial and/or attached piping interaction with safety-related SSCs. The staff concluded that the applicant's December 3, 2004, response related to the scoping and screening results of the auxiliary boiler condensate and feedwater system is acceptable.

2.3B.4.7.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the auxiliary boiler condensate and feedwater system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the auxiliary boiler condensate and feedwater system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.8 Hot Water Heating System

2.3B.4.8.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.8, the applicant described the hot water heating system. The hot water heating system provides hot water for heating of various plant buildings.

The hot water heating system provides isolation in the event of a HELB. The hot water heating system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also provides environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-8, the applicant identified the following hot water heating system component types that are within the scope of license renewal and subject to an AMR: flex connections; flow elements; pipe; tubing; unit heaters; and valves.

2.3B.4.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.8 and Millstone FSAR Section 9.4.12. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.4.8 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the LRA Section 2.3.4.8 states that the hot water heating system provides isolation in the event of a HELB and that the evaluation boundary includes the valves that isolate this break. The FSAR identifies the valves that effect isolation as NSR valves. A license renewal drawing for the hot water heating system shows these valves within the scope of license renewal. In RAI 2.3.4.8-1B, dated June 9, 2004, the staff requested the applicant to explain how the selected system evaluation boundary would ensure that all the system-level intended function including HELB isolation would be effected.

In its response, dated July 26, 2004, the applicant stated that the subject valves credited with the isolation of the HELB were erroneously identified as meeting 10 CFR 54.4(a)(1) instead of meeting 10 CFR 54.4(a)(2) as these valves are NSR. Further, the applicant stated that with respect to HELBs, components are determined to be within the scope of license renewal when they are credited for isolation of pipe breaks in the Millstone 3 current licensing basis for HELBs outside of containment. Components were not determined to be within the scope of license renewal solely to provide isolation of pipe breaks of portions of plant systems that are within the scope of license renewal. Breaks in piping downstream of the subject valves on the license renewal drawing for the hot water heating system are not postulated in the HELB analysis. Therefore, no components exist within the scope of license renewal to isolate breaks in the subject piping.

Based on its review, the staff finds the applicant’s response to RAI 2.3.4.8-1B acceptable, because the applicant adequately explained that the subject valves are not credited to isolate a HELB from the piping not within the scope of license renewal. Therefore, the staff’s concern described in RAI 2.3.4.8-1B is resolved.

2.3B.4.8.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the hot water heating system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the hot water heating system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.9 Hot Water Pre-heating System

2.3B.4.9.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.9, the applicant described the hot water pre-heating system. The hot water pre-heating system supplies heated water to various heating coils in the plant.

The hot water pre-heating system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC and NSR components that are used to mitigate the effects of a HELB. The system also provides environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-9, the applicant identified the following hot water pre-heating system component types that are within the scope of license renewal and subject to an AMR: flow elements; pipe; tubing; and valves.

2.3B.4.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.9 and Millstone FSAR Sections 9.2.6, 10.4.7, and 10.4.9. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.3.4.9 identified an area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. The applicant responded to the staff's RAI as discussed below.

In its review, the staff noted that the LRA Section 2.3.4.9 states that one reason the hot water pre-heating system is within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) is that it contains NSR components that are used to mitigate the effects of a HELB. In order for the staff to complete its review of the hot water pre-heating system, information about the valves credited with the isolation of a HELB was needed. In RAI 2.3.4.9-1B, dated June 9, 2004, the staff requested the applicant to provide the location of the isolation valves on a license renewal drawing and identify the high energy line where the potential break would occur.

In its response, dated July 26, 2004, the applicant stated that LRA Section 2.3.4.9 inadvertently identified a HELB function for the hot water pre-heating system. The applicant further stated that there are no hot water pre-heating system components relied upon to mitigate a HELB in this system.

Based on its review, the staff finds the applicant’s response to RAI 2.3.4.9-1B acceptable, because the applicant adequately explained that the subject valves are not credited to isolate a HELB from the piping not within the scope of license renewal. Therefore, the staff’s concern described in RAI 2.3.4.9-1B is resolved.

2.3B.4.9.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the hot water pre-heating system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the hot water pre-heating system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.10 Steam Generator Chemical Addition System

2.3B.4.10.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.10, the applicant described the steam generator chemical addition system. The steam generator chemical addition system is used during plant shutdown to control steam generator secondary-side water chemistry.

The steam generator chemical addition system provides containment pressure boundary integrity and RG 1.97 safety-related indications. The steam generator chemical addition system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system also provides environmental qualification components.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-10, the applicant identified the following steam generator chemical addition system component types that are within the scope of license renewal and subject to an AMR: pipe and valves.

2.3B.4.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.10 and Millstone FSAR Section 10.4.7. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.4.10.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the steam generator chemical addition system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the steam generator chemical addition system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3B.4.11 Turbine Plant Miscellaneous Drains System

2.3B.4.11.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.11, the applicant described the turbine plant miscellaneous drains system. The turbine plant miscellaneous drains system provides a flowpath for the removal of moisture from the main steam system, including steam lines to the steam-driven auxiliary feedwater pump turbine.

The turbine plant miscellaneous drains system provides a pressure boundary for the main steam system, containment pressure boundary integrity, and RG 1.97 safety-related indications. The turbine plant miscellaneous drains system contains NSR components that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC. The system contains environmental qualification equipment.

Intended functions within the scope of license renewal include the following:

- provides limited structural integrity
- provides a pressure boundary

In LRA Table 2.3.4-11, the applicant identified the following turbine plant miscellaneous drains system component types that are within the scope of license renewal and subject to an AMR: pipe; steam traps; valves.

2.3B.4.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.11 and Millstone FSAR Section 10.3. The staff's review, using the evaluation methodology described in Section 2.3 of this SER, was conducted in accordance with the guidance described in Section 2.3 of NUREG-1800.

In conducting its review, the staff evaluated the system functions described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.3B.4.11.3 Conclusion

During its review of the information provided in the LRA and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the turbine plant miscellaneous drains system. Therefore, the staff concludes that the applicant has adequately identified the turbine plant miscellaneous drains system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the turbine plant miscellaneous drains system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4 Scoping and Screening Results - Structures

This section documents the staff's review of the applicant's scoping and screening results for structures. Specifically, this section discusses the following structures:

- containment
- structures and component supports
- nuclear steam supply system equipment supports
- general structural supports
- miscellaneous structural commodities
- load handling cranes and devices

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must identify and list passive, long-lived structures, systems, and components (SSCs) that are within the scope of license renewal and subject to an AMR. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results. This approach allowed the staff to confirm that there was no omissions of SSCs that meet the scoping criteria and are subject to an AMR.

Staff Evaluation Methodology. The staff's evaluation of the information provided in the LRA was performed in the same manner for all structures. The objective of the review was to determine if the components and supporting structures for a specific structure that appeared to meet the scoping criteria specified in the Rule were identified by the applicant as within the scope of license renewal in accordance with 10 CFR 54.4. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Scoping. To perform its evaluation, the staff reviewed the applicable LRA section and associated component drawings, focusing its review on components that had not been identified as within the scope of renewal. The staff reviewed relevant licensing basis documents, including the final safety analysis report (FSAR), for each structure and component to determine if the applicant had omitted system components with intended functions delineated under 10 CFR 54.4(a) from the scope of license renewal. The staff also reviewed the licensing basis documents to determine if all intended functions delineated in 10 CFR 54.4(a) were specified in the LRA. If omissions were identified, the staff requested additional information to resolve the discrepancy.

Screening. Once the staff completed its review of the scoping results, the staff evaluated the applicant's screening results. For those structures and components with intended functions, the staff sought to determine (1) if the functions are performed with moving parts or involve a change in configuration or properties, or (2) if the structures and components are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). For those that did not meet either of these criteria, the staff sought to confirm that these structures and components were subject to an AMR as required by 10 CFR 54.21(a)(1). If discrepancies were identified, the staff requested additional information to resolve them.

Tables 2.2-4 in the Millstone 2 and Millstone 3 LRAs are identical; they list the structures that are not within the scope of license renewal. The staff's review of LRA Table 2.2-4 identified several areas in which additional information was necessary to complete the review of the applicant's scoping results. Therefore, the staff issued RAI 2.4-1 and RAI 2.4-2, to determine whether the applicant properly applied the scoping criteria of 10 CFR 54.4(a).

RAI 2.4-1. For most of the structures listed, there is no descriptive information in the FSARs. Consequently, the staff could not conclude that all of the structures listed in LRA Table 2.2-4 serve no intended function. For each of the following structures not described in the FSARs, the applicant was requested to submit its technical basis for concluding the structure is not within the scope of license renewal:

- above ground 6000-gallon fuel tank foundation
- above ground diesel fuel tank foundation
- above ground gasoline tank foundation
- a-frame
- block house (electric)
- chemistry safety storage building
- condensate polishing service water strainer house (Unit 2)
- flammable liquids/ hazardous material building
- flammable storage buildings
- fuel oil storage facility
- gas bottle storage building
- hazardous waste processing
- hazardous waste storage building
- hydrogen recombiner portable personnel contamination monitors (PCM) enclosure
- incompatible hazardous waste storage building
- low-level radwaste storage
- Millstone radwaste reduction facility PCM enclosure
- steel transmission towers
- Unit 1 discharge structure
- Unit 1 intake structure
- Unit 1 reactor building
- Unit 1 solid radwaste building
- Unit 1 switchyard
- Unit 1 waste surge tank foundation
- Unit 1 xenon-krypton building
- Unit 2 hydrogen cylinder storage area
- Unit 2 service water pump strainer house structure
- Unit 3 auxiliary building PCM enclosure
- Unit 3 condensate surge tank foundation
- Unit 3 domestic water storage tank foundation

- Unit 3 groundwater underdrains storage tank foundation
- Unit 3 PGST A and B nitrogen storage tank foundation
- Unit 3 water treatment storage tank foundation

The applicant was also asked to verify that a seismic II/I intended function, in accordance with 10 CFR 54.4(a)(2), is not applicable to any of the structures and structural components listed in LRA Table 2.2-4.

In its response to RAI 2.4-1, dated December 3, 2004, the applicant stated:

<u>Part 1</u>

> 6000 Gal. Above Ground Fuel Tank Foundation (bldg 484)
>
> The foundation for this tank is the concrete loading dock. This is a freestanding modular tank structure that is located on top of the concrete loading dock between buildings 409 and 410. The tank does not have a foundation designed specifically for the tank. The tank stores heating fuel oil for the heating systems in these buildings. Neither these buildings nor the loading dock or the tank has a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.
>
> Above Ground Diesel Fuel Tank Foundation (bldg 476)
>
> This is a concrete foundation that provides structural support for the tank that is used to store diesel fuel oil for the motor pool. Neither the foundation nor the tank has a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.
>
> Above Ground Gasoline Tank Foundation (bldg 474)
>
> This is a concrete foundation that provides structural support for the tank that is used to store gasoline for the motor pool. Neither the foundation nor the tank has a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.
>
> A-Frame (bldg 503)
>
> This is a freestanding structure outside the protected area that is used for meetings and administrative functions. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.
>
> Block House (Electric) (bldg 423)
>
> This is a freestanding structure that houses electrical equipment for the non-safety related off-site power supply. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Chemistry Safety Storage Building (bldg 457)

This is a freestanding modular structure that is used for temporary storage of flammable or hazardous materials. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Condensate Polishing Service Water Strainer House (Unit 2) (bldg 222)

This is the same structure as the "Unit 2 Service Water Pump Strainer House Structure" listed below. This Class II structure is located adjacent to and north of the Unit 2 Intake Structure and originally housed the strainer for the service water supply to the condensate polishing facility. The service water supply is no longer required, the strainer has been removed, and the associated piping is capped and abandoned. The building is currently used by the Maintenance Department for storage of maintenance equipment. It does not contain any equipment that is within the scope of license renewal. The Unit 2 Intake Structure, which is a safety related Class I structure, is within the scope of license renewal.

The Condensate Polishing Service Water Strainer House is a heavily reinforced concrete structure with 12-inch-thick walls and an 8-inch reinforced concrete roof slab that supports a built-up roofing system. The Condensate Polishing Service Water Strainer House is separated from the Intake Structure by a seismic gap filled with compressible material. This compressible material is within the scope of license renewal and subject to aging management. It is included in the Commodity Group "Expansion joint/Seismic gap material (between adjacent buildings/structures)," as indicated in LRA Table 2.4.2-25, Miscellaneous Structural Commodities.

FSAR Section 5.1.1.1 Class I Structures states that "Class I structures are designed to withstand the appropriate seismic and other applicable loads without loss of function. These Class I structures are sufficiently isolated or protected from Class II structures to ensure that their integrity are maintained at all times."

Based on the statements from FSAR Section 5.1.1.1 and on the robust design and construction of the Condensate Polishing Service Water Strainer House including the seismic gap, it is not credible to postulate failure of this structure. Even if such failure is postulated, it will not prevent the Class I Intake Structure from performing its intended function. However, to conservatively ensure the integrity of the Class 1 Intake Structure, the Condensate Polishing Service Water Strainer House will be added to the scope of license renewal. The structure consists of structural reinforced concrete in air and atmosphere/weather environment. The aging effects requiring management are loss of material, cracking, and change of material properties. These aging effects will be managed by the Structures Monitoring Program AMP that is described in LRA Section B2.1.23. The aging management review results are included in Table 1.

Flammable Liquids/ Hazardous Material Building (bldg 479)

This is a freestanding modular structure that is used for temporary storage of flammable or hazardous materials. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Flammable Storage Buildings (bldgs 421, 477, 481)

These are freestanding structures that are used for temporary storage of flammable materials. None has a license renewal intended function. These non-safety related structures are located such that they do not affect any safety related structures.

Fuel Oil Storage Facility (bldg 128)

This is a freestanding structure that was under construction when it was abandoned in place. It was never completed and does not store any fuel oil. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Gas Bottle Storage Building (bldg 450)

This is a freestanding structure that is used for storage of bottled gas. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Hazardous Waste Processing (bldg 455)

This is a freestanding structure that is used for processing hazardous waste. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Hazardous Waste Storage Bldg. (bldg 543)

This is a freestanding structure outside the protected area that is used for temporary storage of hazardous waste materials. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Hydrogen Recombiner Portable PCM Enclosure (bldg 657)

This enclosure housed the personnel contamination monitors (PCM) used for monitoring personnel contamination when exiting the radiologically controlled area of the hydrogen recombiner building. This enclosure has been removed from the south side of the hydrogen recombiner building.

Incompatible Hazardous Waste Storage Bldg. (bldg 544)

This is a freestanding structure outside the protected area that is used for temporary storage of incompatible hazardous waste materials. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Low Level Radwaste Storage (bldg 505)

This is a freestanding structure outside the protected area that is used for temporary storage of low-level radwaste materials. It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

MRRF PCM Enclosure (bldg 461)

This is a freestanding structure that houses the personnel contamination monitors (PCM) used for monitoring personnel contamination when exiting radiologically controlled area at the Millstone Radwaste Reduction Facility (MRRF). It does not have a license renewal intended function. This non-safety related structure is located such that it does not affect any safety related structures.

Steel Transmission Towers

These are freestanding steel towers mounted on concrete foundations. The steel transmission towers and their foundations are generally not within the scope of license renewal with one exception. The three steel transmission towers and foundations required to support the electrical lines for Station Blackout as required by 10 CFR 54.4(a)(3) are within the scope of license renewal. These towers are identified as being within the scope of license renewal in Section 2.4.2.25 of the Unit 3 LRA and Section 2.4.2.16 of the Unit 2 LRA. The remaining steel towers are those referenced in Table 2.2-4.

Of the three towers that are in scope, one tower supports the 345kV lines between the Unit 3 reserve station service transformer and the switchyard and the other two support the 345kV lines between the Unit 2 reserve station service transformer and the switchyard as shown on license renewal Site Plan 25205-LR10025.

The height of Steel Transmission Towers varies from 85 to 115 feet as indicated in the table below.

Tower No.	Height (ft)	Unit	In-scope of LR
1T-1	100	1	N
1T-2	115	1	N
1T-3	115	1	N
1G-1	105	1	N
1G-2	105	1	N
1G-3	110	1	N
2T-2	85	2	Y
2T-3	90	2	Y
2G-2	85	2	N
2G-3	90	2	N
3G-2	85	3	N
3G-3	110	3	N
3T-3	110	3	Y

All steel transmission towers are located far enough away from the plant so that if any were to fall, they would not cause any damage to any in scope structure/component that performs a safety related function.

The steel transmission tower not within the scope of license renewal that is closest to a safety related structure/component is tower number 3G-2. The safety related structure is the Unit 3 Refueling Water Storage Tank (bldg 313). This tower is 85 feet tall and is located approximately 160 feet to the east of the Refueling Water Storage Tank. All the remaining steel transmission towers that are not within the scope of license renewal are more than 360 feet away from any safety related structure/component.

Unit 1 Discharge Structure (bldg 102)

This is a reinforced concrete embedment type structure that terminates the Unit 1 condenser discharge piping where it enters the common discharge quarry. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the site. It does not have a license renewal intended function. This Unit 1 non-safety related structure is located such that it does not affect any Unit 2 or Unit 3 safety related structures.

Unit 1 Intake Structure (bldg 107)

This is a freestanding reinforced concrete structure that houses the cooling water pumps that used to supply the Unit 1 condenser and service water systems. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. This Unit 1 non-safety related structure is located such that it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 1 Reactor Building (bldg 111)

This is a reinforced concrete structure that houses the remnants of the Unit 1 nuclear reactor, and the spent fuel pool. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. The Unit 1 reactor building structure is being maintained as safety-related class 1 for Unit 1 decommissioning purposes only. Therefore, it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 1 Solid Radwaste Building (bldg 119)

This is a concrete and steel structure that provides an area for indoor storage of solid radwaste for the Unit 1 radwaste processing systems. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. This Unit 1 non-safety-related structure is located such that it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 1 Switchyard (bldg 104)

This is a series of steel structures that supports the transmission equipment for the electrical power previously generated at Unit 1. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. This Unit 1 non-safety-related structure is located such that it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 1 Waste Surge Tank Foundation (bldg 115)

This is a concrete foundation that provides structural support for the waste surge tank. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. This Unit 1 non-safety-related structure is located such that it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 1 Xenon-Krypton Building (bldg 116)

This is a freestanding concrete structure that houses the charcoal absorption beds previously used to process effluent gases from Unit 1. It is part of the permanently defueled boiling water reactor nuclear power complex located at the southern end of the Millstone site. It does not have a license renewal intended function. This Unit 1 non-safety-related structure is located such that it does not affect any Unit 2 or Unit 3 safety-related structures.

Unit 2 Hydrogen Cylinder Storage Area (bldg 226)

This is a freestanding multi-tank structure that is used for storage and supply of hydrogen used at Unit 2. The structure consists of a concrete slab foundation on grade that supports a masonry block wall on two sides. Upon further review, the masonry block wall has been determined to function as a firewall between the storage facility and the Unit 2 turbine building and should have been identified with a fire barrier function. As a result, this structure has been added to the scope of license renewal

Unit 2 Service Water Pump Strainer House Structure (bldg 222)

This is the same structure as the “Condensate Polishing Service Water Strainer House (Unit 2)” listed above.

Unit 3 Auxiliary Building PCM Enclosure (bldg 463)

This is a wooden structure that houses the personnel contamination monitors (PCM) used for monitoring personnel contamination when exiting the radiologically controlled areas within the buildings of the Unit 3 nuclear power complex. It does not have a license renewal intended function. This non-safety-related structure is located such that it does not affect any safety-related structures.

Unit 3 Condensate Surge Tank Foundation (bldg 304)

This is a concrete foundation that provides structural support for the condensate surge tank. Neither the foundation nor the tank has a license renewal intended function. This non-safety-related structure is located such that it does not affect any safety-related structures.

Unit 3 Domestic Water Storage Tank Foundation

This item was listed in error. Unit 3 does not have a tank (or foundation) with this name. Unit 3 does have a water treatment storage tank that contains domestic water. The Water Treatment Storage Tank and its foundation are not within the scope of license renewal. This non-safety-related structure is located such that it does not affect any safety-related structures.

Unit 3 Groundwater Underdrains Storage Tank Foundation

This tank shares the concrete foundation of the refueling water storage tank (bldg 313). Note that LRA Section 2.2-4 inadvertently listed a structure “Unit 3 Groundwater Underdrains Storage Tank Foundation” although there is no such structure at Millstone Power Station. The refueling water storage tank and its foundation are within the scope of license renewal. In addition, the groundwater underdrains storage tank was added to the scope of license renewal during the 10 CFR 54.4(a)(2) review (reference RAI 2.1-1). Therefore, both tanks and the common foundation are within the scope of license renewal.

Unit 3 PGST A and B Nitrogen Storage Tank Foundation

This is a concrete foundation that provides structural support for the A & B primary grade water storage tanks nitrogen system tank. It is located adjacent to the primary grade water storage tanks foundation. Neither this tank nor its foundation has a license renewal intended function. These non-safety-related structures are located such that they do not affect any safety-related structures.

Unit 3 Water Treatment Storage Tank Foundation (bldg 306)

This is a concrete foundation that provides structural support for the water treatment storage tank. Neither this tank nor its foundation has a license renewal intended function. This nonsafety-related structure is located such that it does not affect any safety-related structures.

Part 2

With regard to verification of the applicability of the seismic II/I intended function for all the structures or structural components in LRA Table 2.2-4, the scoping process, outlined in Section 2.1.4.1, required review of the seismic II/I intended function of all of the structures. The structures reviewed above provide another verification through a sampling of the process and indicate that the scoping methodology is consistent with the requirements in 10 CFR 54.4.

Based on its review, the staff finds the applicant's response to RAI 2.4-1 acceptable for all of the structures listed in the RAI. The staff concurs with the applicant's decision to include several of the listed structures within the scope of license renewal. The staff also concurs with the applicant's basis for excluding the remaining listed structures from the license renewal scope. The staff evaluated the applicant's AMR results for the structures added to the license renewal scope, including Tables 1 and 2 attached to this response, in Section 3.5 of this DSER.

Therefore, the staff considers its concern described in RAI 2.4-1 resolved for all structures listed in the RAI.

In addition, the staff issued RAI 2.4-2 to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a). The staff's RAI is described below.

Based on the review of the FSAR sections referenced in LRA Table 2.2-4 and additional related sections of the FSAR, the staff could not conclude that all of the structures described in the FSAR sections serve no intended function.

Part 1

The Units 2 and 3 main and normal station transformers are described in Unit 2 FSAR Section 8.1.1, Unit 3 FSAR Section 8.1.7, and Unit 3 FSAR Section 8.3.1.1.1. In Unit 3 FSAR Section 8.3.1.1.1, it states:

> The normal station service transformers have the capacity to supply normal auxiliaries and those emergency auxiliaries (both load groups) required during normal operation up to the full output of the main generator plus the capacity to supply Millstone Unit 2 GDC 17 requirements as an alternate offsite source for minimum post-accident loads." and "Power is supplied to the normal 6.9 kV and 4.16 kV buses through four stepdown transformers, of which two are normal station service transformers and two are reserve station service transformers. Each transformer is fully rated to carry all the loads on its buses during normal operation and any postulated design basis accident plus to carry Millstone Unit 2 minimum post-accident loads to satisfy GDC 17 requirements as a Unit 2 alternate offsite source.

In Unit 3 FSAR Section 3.1.2.5 "Sharing of Structures, Systems, and Components (Criterion 5)," it states:

> The following equipment may be shared and utilized by Millstone Unit 2 to meet its GDC 17 requirements for an alternate offsite source to relieve one of its emergency diesel generators and supply power to minimum post-accident loads:
>
> - Main Transformers 15G-3X-A and 15G-3X-B
> - Normal Station Service Transformer 15G-3SA
> - Reserve Station Service Transformer 15G-23SA

The sharing of this equipment does not impair its ability to perform its safety function. The transformers are adequately sized and have sufficient capacity to meet maximum postulated Unit 3 loading requirements while supplying Unit 2 General Design Criterion-17 (GDC-17) minimum loads.

Based on this FSAR information, it appeared to the staff that some of these transformers perform an intended function; if so, then the transformers' structural support would also perform an intended function. The applicant was requested to clarify whether any of these transformers and their structural supports perform an intended function and need to be included within the scope of license renewal.

<u>Part 2</u>

"Miscellaneous Warehouses (#9, #8, #3, #4, #5, #6)" are listed in LRA Table 2.2-4 as out-of-scope. The FSAR reference is Unit 3 FSAR Section 3.1.2.5 and FPER 5.5 Analysis 76. The staff notes that LRA Tables 2.2-3 for both Unit 2 and Unit 3 list the "Unit 2 Condensate Polishing Facility and Warehouse No. 5" as being within the scope of license renewal. The applicant was requested to clarify whether Warehouse No. 5 is within the scope of license renewal and to provide the technical basis for its determination.

<u>Part 3</u>

The Unit 2 sodium hypochlorite building is described in Unit 2 FSAR Section 5.6.1. It states:

> An adjacent Class II building, which houses the chlorination equipment, is isolated from the intake structure by a joint filled with compressible material. General layouts of the intake structure and circulating water system are shown on Figures 5.6-1 and 5.6-2, respectively.

Based on Unit 2 FSAR Figure 5.6-1, it appeared to the staff that failure of the Class-2 building in a seismic event has the potential to damage safety-related structures and components in close proximity. The applicant was requested to submit its technical basis for concluding that the Unit 2 Sodium hypochlorite building does not satisfy the criteria of 10 CFR 54.4(a)(2), for inclusion within the scope of license renewal.

Part 4

The following tank foundations are referenced to the FSAR sections noted in parentheses:

> Unit 1 Demineralized Water Storage Tank Foundation (Unit 2 FSAR Table 9.12 - 1)
> Unit 2 Condensate Surge Tank Foundation (Unit 2 FSAR Section 2.7.5.1)
> Unit 2 Primary Water Storage Tank Foundation (Unit 2 FSAR Table 9.12 - 1)
> Unit 3 Boron Test Tanks Foundation (Unit 3 FSAR Section 9.3.5.2)
> Unit 3 Liquid Nitrogen Storage Tank Foundation (Unit 3 FSAR Section 9.2.8.2)
> Unit 3 Primary Grade Water Storage Tank Foundation (Unit 3 FSAR Section 9.2.8.3)
> Unit 3 Waste Test Tanks Foundation (Unit 3 FSAR Section 11.2.2.1)
> Unit 3 Yard Vacuum Priming Tank Foundation (Unit 3 FSAR, FPER 5.5 Analysis 86)

The applicant was requested to verify that none of the systems serviced by these tanks are within the scope of license renewal. If any system is within the scope of license renewal, the applicant was requested to submit the technical basis for concluding that the associated tank and its foundation is not within the scope of license renewal.

In its response to RAI 2.4-2, dated December 3, 2004, the applicant stated:

Part 1

> Both Millstone Unit 2 and Unit 3 are designed with preferred normal and alternate offsite power supplies, as described in the FSAR sections cited in RAI 2.4-2. The design for offsite power supply includes the main transformers, normal station service transformers, and reserve station service transformers. In addition, the Millstone Unit 2 licensing basis, for general design criterion (GDC) 17 requirements, credits Unit 3 electrical components, including the main transformers, and a normal station service and reserve station service transformer, as an alternate offsite power source. For both units, the emergency onsite power source (i.e., the emergency diesel generators), is the safety-related power source credited in the accident analyses. The emergency onsite power source components are included within the scope of license renewal. The main transformers and normal station service transformers do not meet the scoping criteria of 10 CFR 54.4(a) and do not perform a license renewal intended function. These transformers do not meet 10 CFR 54.4(a)(1) since they are non-safety-related components and do not perform safety-related functions. They do not meet 10 CFR 54.4(a)(2) since their failure cannot prevent the accomplishment of the intended function of any safety-related equipment, and they do not meet 10 CFR 54.4(a)(3) since they are not credited for any of the cited regulated events. Therefore, the main and normal station service transformers that provide the preferred normal and alternate offsite power supplies to the units are not included within the scope of license renewal. The reserve station service transformers for both Millstone Unit 2 and Unit 3 are included in scope per 10 CFR 54.4(a)(3) because they are required for the restoration of offsite power following a station blackout event. The reserve station service transformers

foundations are within the scope of license renewal and are included in Unit 2 LRA Table 2.4.2-16 and Unit 3 LRA Table 2.4.2-25 as "Structural Reinforced Concrete."

Part 2

There are two separate and individual site structures that have the designation Warehouse No. 5. These structures are shown on the License Renewal Site Plan (license renewal drawing 25205-LR10025, Sh. 1) as Building No. 212 (Unit 2 Condensate Polishing Facility and Warehouse No. 5) and Building No. 435 (Warehouse #5). Tables 2.2-3 for both Unit 2 and Unit 3 list the Unit 2 Condensate Polishing Facility and Warehouse No. 5, so designated since the Condensate Polishing Facility is located within this building, as being within the scope of license renewal. Unit 2 LRA Section 2.4.2.10 and Unit 3 LRA Section 2.4.2.20 provide a description of this structure and the criteria for which it is considered within the scope of license renewal.

Building No. 435 does not house any equipment or systems that meet the criteria for inclusion within the scope of license renewal. Therefore, this building is not within the scope of license renewal and is listed in LRA Table 2.2-4 for both Unit 2 and Unit 3 under Miscellaneous Warehouses (#9, #8, #3, #4, #5, #6).

Part 3

The Unit 2 FSAR Section 5.1.1.1, Class I Structures, states that "Class I structures are designed to withstand the appropriate seismic and other applicable loads without loss of function. These Class I structures are sufficiently isolated or protected from Class II structures to ensure that their integrities are maintained at all times."

The Class II Sodium Hypochlorite Building for Unit 2 is located adjacent to and east of the Class I Intake Structure. Two safety-related cable pits are also located adjacent to and east of the Intake Structure, one to the north of and near, the other to the south of and near the Sodium Hypochlorite Building.

The Sodium Hypochlorite Building is a reinforced concrete structure 16 ft. tall with 12-inch thick walls and a structural steel roof support system. It does not contain any equipment that is within the scope of license renewal and is a robust structure that is unlikely to fail in a seismic event. It is separated from the Intake Structure by a seismic gap filled with compressible material. This compressible material is within the scope of license renewal and subject to aging management. It is included in the Commodity Group "Expansion joint/Seismic gap material (between adjacent buildings/structures)," as indicated in LRA Table 2.4.2-25, Miscellaneous Structural Commodities.

The Class I Intake Structure is a reinforced concrete structure with wall thickness of 1 ft.- 3 in. where it is adjacent to the Sodium Hypochlorite Building wall and is within the scope of license renewal. The Intake Structure is designed and sufficiently isolated or protected from the Class II Sodium Hypochlorite Building to ensure that its integrity is maintained at all times as stated in FSAR Section 5.1.1.1, Class I Structures.

The cable pits are designated safety-related since they house safety-related cables and are concrete bunkers consisting of 12-inch-thick reinforced concrete walls and roof supported on a reinforced concrete foundation. The robust design of the cable pits and separation from the Sodium Hypochlorite Building (1 foot 5 ¼ inches) is adequate to ensure that they are sufficiently isolated or protected from the Class II Sodium Hypochlorite Building to ensure that their integrity are maintained at all times.

Based on the statements from FSAR Section 5.1.1.1 and on the robust design and construction of the Sodium Hypochlorite Building including the seismic gap, it is not credible to postulate failure of this structure during a design basis earthquake. Even if such failure is postulated, it will not prevent the Class I Intake Structure or the Cable Pits from performing their respective intended functions. However, to conservatively ensure the integrity of the Class 1 Intake Structure and the Safety-related Cable Pits, the Sodium Hypochlorite Building will be added to the scope of license renewal. The structure consists of structural reinforced concrete in soil, air, and atmosphere/weather environments and structural steel members in an air environment. The aging effects requiring management are loss of material, cracking, and change of material properties for structural reinforced concrete and loss of material for structural steel. These aging effects will be managed by the Structures Monitoring Program AMP that is described in LRA Section B2.1.23. The aging management review results are included in Table 1.

Part 4

- Unit 1 Demineralized Water Storage Tank Foundation (Unit 2 FSAR Table 9.12-1): The Millstone Unit 1 demineralized water storage tank has been permanently removed from service and is not within the scope of license renewal. Therefore, the tank foundation is not within the scope of license renewal.

- Unit 2 Condensate Surge Tank Foundation (Unit 2 FSAR Section 2.7.5.1): The condensate surge tank is part of the Condensate Storage and Transfer System which provides a protected water source for the auxiliary feedwater pumps. The condensate surge tank itself is not the protected water source required to support this license renewal system intended function and is not within the scope of license renewal. Therefore, the associated tank foundation is not within the scope of license renewal.

-Unit 2 Primary Water Storage Tank Foundation (Unit 2 FSAR Table 9.12-1): The primary water storage tank is part of the Primary Makeup Water System, which is within the scope of license renewal. The Primary Makeup Water System includes safety-related instrumentation and provides a containment pressure boundary. The system meets 10 CFR 54.4(a)(2) since the system contains non-safety-related components that are spatially oriented such that their failure could prevent the function of safety-related SSCs. The system also meets 10 CFR 54.4(a)(3) because it contains environmentally qualified equipment. The source of water provided by the tank does not support the system intended functions and the tank was not originally included within the scope of license renewal. However, in response to RAI 2.1-1 the Unit 2 primary water storage tank and foundation were added to the scope of license renewal.

- Unit 3 Boron Test Tanks Foundation (Unit 3 FSAR Section 9.3.5.2): The boron test tanks are part of the Boron Recovery System which contains non-safety-related components that are spatially oriented such that their failure could prevent the function of safety-related SSCs. The system also meets 10 CFR 54.4(a)(3) because it supports fire protection by providing an alternate letdown path to the boron recovery tanks. The boron test tanks themselves do not support the system intended functions and are not within the scope of license renewal. Therefore, the associated foundation is not within the scope of license renewal.

- Unit 3 Liquid Nitrogen Storage Tank Foundation (Unit 3 FSAR Section 9.2.8.2): The liquid nitrogen storage tank is part of the Nitrogen System, which is within the scope of license renewal. The Nitrogen System meets 10 CFR 54.4(a)(1) because it includes safety-related instrumentation and provides a containment pressure boundary. The system meets 10 CFR 54.4(a)(2) since the system contains non-safety-related components that are spatially oriented such that their failure could prevent the function of safety-related SSCs. The system also meets 10 CFR 54.4(a)(3) because it supports fire protection and contains environmentally qualified equipment. However, the liquid nitrogen storage tank itself is not required to support any license renewal system intended functions. Therefore, the liquid nitrogen storage tank and foundation are not included within the scope of license renewal.

- Unit 3 Primary Grade Water Storage Tank Foundation (Unit 3 FSAR Section 9.2.8.3): The primary grade water storage tank is part of the Primary Grade Water System, which is within the scope of license renewal. The Primary Grade Water System meets 10 CFR 54.4(a)(1) because it includes safety-related instrumentation and provides a containment pressure boundary. The system meets 10 CFR 54.4(a)(2) since the system contains non-safety-related components that are spatially oriented such that their failure could prevent the function of safety-related SSCs. The system also meets 10 CFR 54.4(a)(3) because it supports station blackout events and contains environmentally qualified equipment.

However, the source of water provided by the primary water storage tanks does not support any license renewal system intended functions. Therefore, the tanks and associated foundation are not included within the scope of license renewal.

- Unit 3 Waste Test Tanks Foundation (Unit 3 FSAR Section 11.2.2.1): The waste test tanks are part of the Radioactive Liquid Waste Processing System which contains non-safety-related components that are spatially oriented such that their failure could prevent the function of safety-related SSCs. The waste test tanks are not located near any SR SSCs and do not perform a license renewal intended function. Therefore, the tanks and associated foundation are not within the scope of license renewal.

- Unit 3 Yard Vacuum Priming Tank Foundation (Unit 3 FSAR, FPER 5.5 Analysis 86): The yard vacuum priming tank is part of the Vacuum Priming System which is not within the scope of license renewal since it does not meet any of the criteria of 10 CFR 54.4(a). Therefore, the yard vacuum priming tank and associated foundation are not within the scope of license renewal.

Based on its review, the staff finds the applicant’s response to RAI 2.4-2 acceptable for Parts 1, 2, 3, and 4 of the RAI. In response to Part 1, the applicant identified the reserve station service transformers and their foundations as in-scope, to meet 10 CFR 54.4(a)(3) for station blackout. In response to Part 2, the applicant clarified the difference between Warehouse No. 5 and Warehouse #5. In response to Part 3, the applicant identified that the Unit 2 Sodium Hypochlorite Building has been added to the license renewal scope. In response to Part 4, the applicant provided an acceptable basis for excluding the subject tank foundations, but noted that the Unit 2 Primary Water Storage Tank and Foundation have been added to the LR scope in response to RAI 2.1-1. The staff considers its concern described in RAI 2.4-2 to be resolved.

RAI 2.4.3. The staff also requested additional information concerning the possibility that some thermal insulation may serve an intended function, in accordance with 10 CFR 54.4(a)(2), to control the maximum temperature of safety-related structures and structural components that meet 10 CFR 54.4(a)(1). Thermal insulation is typically passive and long-lived. If it also serves an intended function in accordance with 10 CFR 54.4(a)(2), then it meets the criteria for inclusion within the scope of license renewal. Therefore, the staff issued RAI 2.4-3, to determine whether the applicant properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1) to thermal insulation. The staff's RAI is described below.

Thermal insulation is typically passive and long-lived. If it also serves an intended function in accordance with 10 CFR 54.4(a)(2), it meets the criteria for inclusion within the scope of license renewal.

Possible examples of intended functions are (1) maintaining the maximum temperature of NSSS support members below the maximum temperature assumed in the design basis of the supports; and (2) maintaining the maximum temperature of structural concrete below the threshold levels of 150 °F for general areas and 200 °F for local areas around hot penetrations.

Part 1 - Millstone 2

Millstone 2 FSAR Section 5.2.7.2.2, "Design of High-Temperature Penetrations," states:

> High-temperature piping penetrations consist of two for feedwater, two for main steam, and two for steam generator blowdown. These have a maximum operating temperature range between 435 °F and 550 °F. Thermal insulation is provided in the air gap between the pipe and penetration liner sleeve. The combination of insulation and penetration cooling is designed to restrict maximum temperature in the concrete to 150 °F.
>
> For the condition created by loss of penetration cooling, the maximum steady state temperature in the concrete is 300 °F at the penetration surface and decreases to 120 °F at a maximum radial depth of 48 inches in the containment wall (Section 9.9.4.4.1).

Millstone 2 FSAR Section 9.9.4, "Containment Penetration Cooling System," states in subsection 9.9.4.4.1:

> The containment penetration cooling system is provided with two full-capacity fans. Each fan has the capability of maintaining the concrete temperature around the sleeve below 150 °F. Following the unlikely loss of penetration cooling, a maximum temperature of 390 °F may be tolerated for 120 days without appreciable loss of strength of the concrete (Subsection 5.1.3).

Millstone 2 LRA Section 2.3.3.18, "Containment Penetration Cooling System," states:

> The Containment Penetration Cooling System functions to limit the temperature of Containment structure concrete to 150 °F in the vicinity of hot piping penetrations. The

> system consists of two vane axial fans and the associated system ductwork and dampers. The system contains fire dampers to prevent the spread of a fire.
>
> The Containment Penetration Cooling System is within the scope of license renewal because the system meets 10 CFR 54.4(a)(2) by providing cooling air to the concrete area surrounding the Containment piping penetrations. The Containment Penetration Cooling System also supports fire protection.

From the information in FSAR Section 5.2.7.2.2, thermal insulation works in combination with the containment penetration cooling system to limit the temperature of concrete at high-temperature penetrations. LRA Section 2.3.3.18 indicates that the containment penetration cooling system is within the scope of license renewal because the system meets 10 CFR 54.4(a)(2). On this basis, it appears to the staff that the thermal insulation also meets 10 CFR 54.4(a)(2).

Therefore, the applicant was requested to (1) identify whether any thermal insulation at Millstone 2 serves an intended function in accordance with 10 CFR 54.4(a)(2); (2) describe plant-specific operating experience related to degradation of (a) thermal insulation in general, and (b) thermal insulation that serves an intended function in accordance with 10 CFR 54.4(a)(2); and (3) describe the scoping and screening evaluation for thermal insulation that serves an intended function in accordance with 10 CFR 54.4(a)(2), including the technical basis for either inclusion within or exclusion from the scope of license renewal.

<u>Part 2</u> - <u>Millstone 3</u>

Millstone 3 FSAR Section 3.8.1.1.4 (D)(1) describes “Sleeved Piping Penetration” as follows:

> These penetrations have a sleeve around the outside of forged piping with integral flued head. Sleeved penetrations are used for multiple small pipes passing through one penetration and for thermally hot piping systems. Thermally hot piping is insulated to prevent the operating temperature of the concrete adjacent to the sleeve, during normal operation or any other long-term period, from exceeding 150 °F except at local areas around the penetrations which are allowed to have increased temperatures not exceeding 200 °F; for accident or other short-term periods, the temperatures are not to exceed 350 °F for the interior surface. However, local areas are allowed to reach 650 °F from steam or water jets in the event of pipe failure. Penetrations in which the insulation would be insufficient to maintain the concrete within the allowable temperature limit are equipped with a cooling jacket located inside the sleeve. The cooling water for the cooling jacket is supplied by the component cooling water subsystem. Each penetration sleeve carrying thermally hot piping is designed with adequate space between the sleeve and the piping to allow for the required pipe insulation and for the cooling jacket.

Millstone 3 LRA Table 2.3.3-4 identifies “Penetration Coolers” as a component type requiring aging management for the reactor plant component cooling system.

From the information in FSAR Section 3.8.1.1.4 (D)(1), thermal insulation works alone or in combination with the cooling jacket to limit the temperature of concrete at high-temperature penetrations. LRA Table 2.3.3-4 indicates that penetration coolers are included within the scope of license renewal. On this basis, it appears to the staff that the thermal insulation serves an intended function in accordance with 10 CFR 54.4(a)(2) and meets the criteria for inclusion within the scope of license renewal.

Therefore, the applicant was requested to (1) identify whether any thermal insulation at Millstone 3 serves an intended function in accordance with 10 CFR 54.4(a)(2); (2) describe plant-specific operating experience related to degradation of (a) thermal insulation in general, and (b) thermal insulation that serves an intended function in accordance with 10 CFR 54.4(a)(2); and (3) describe the scoping and screening evaluation for thermal insulation that serves an intended function in accordance with 10 CFR 54.4(a)(2), including the technical basis for either inclusion within or exclusion from the scope of license renewal.

In its response to RAI 2.4-3, dated November 9, 2004, the applicant stated that:

> There is no discussion of insulation functioning to limit the maximum temperature of NSSS equipment supports included in the FSAR. There are no insulated NSSS equipment supports.
>
> Cooling systems and the application of thermal insulation for high-temperature piping containment penetrations are designed to maintain containment structure concrete temperatures within limits to ensure that long-term degradation of the concrete does not occur that could degrade the integrity of the structure, as identified in the FSAR references cited in RAI 2.4-3. Although failure of the penetration cooling systems would not immediately result in the inability of the containment structure to perform its intended function, the penetration cooling systems were conservatively included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2).
>
> There is currently no thermal insulation included within the scope of license renewal for Millstone Unit 2 or Unit 3. Since the thermal insulation associated with containment piping penetrations functions to limit the heat transferred to the surrounding concrete, similar to the piping penetration cooling systems that are within the scope of license renewal, Dominion will conservatively also include the thermal insulation within the scope of license renewal. The intended function applied to the insulation is to prevent excessive heat transmission to the containment concrete surrounding the piping penetrations.

Based on the aging management review performed for the fiberglass, asbestos, and calcium silicate piping penetration thermal insulation, there are no applicable aging effects in the indoor air environment and no aging management program is required.

Based on its review, the staff finds the applicant’s revised response to RAI 2.4-3 acceptable because the applicant has included the subject thermal insulation within the scope of license renewal. The staff considers RAI 2.4-3 resolved.

2.4A Unit 2 Scoping and Screening Results - Structures

2.4A.1 Containment

2.4A.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.1, the applicant identified the structures and components of the containment that are subject to an AMR for license renewal. The containment is a Class I structure, housing the reactor, NSSS equipment, and various safety-related and non-safety-related components. The evaluation boundary of the containment consists of the containment structure, including the liner and internal structural members, and containment penetrations (equipment access and personnel lock openings, piping penetrations, electrical penetrations, and the fuel transfer tube assembly). The neutron shield tank, refueling cavity liner and reactor cavity seal ring are also included in the containment evaluation boundary.

The containment is a Class I structure. The containment non-safety-related structural members support the function of safety-related equipment. The containment also contains EQ equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides a pressure boundary
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides EQ barrier and/or HELB barrier
- provides jet impingement shielding for high energy line breaks

In LRA Table 2.4.1-1, the applicant identified the following containment component types that are within the scope of license renewal and subject to an AMR: containment liner; containment shell (cylindrical wall and dome); containment sump screen; door locking mechanism; electrical penetrations; equipment hatch; equipment pads/grout; expansion bellows; fuel transfer tube; fuel transfer tube gate valve; fuel transfer tube penetration; gaskets; hinges and pins; jet impingement barriers; mechanical penetrations; miscellaneous steel [brackets, checkered plates, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; missile barriers; moisture barrier; neutron shield tank; o-rings; personnel lock; pipe; primary shield wall plate; reactor cavity seal ring; refueling cavity liner; spare penetrations; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls); structural steel (beams, bracing, columns and baseplates, trusses); tendon anchorages; tendon gallery; tendon wires; and valve bodies.

2.4A.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.1 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the containment described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.1 identified several areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. Therefore, the staff issued RAIs 2.4-4, 2.4-5, and 2.4-12 to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1).

RAIs 2.4-4 and 2.4-5 are applicable to both Unit 2 and Unit 3. The staff's RAIs, the applicant's responses, and the staff's evaluations are documented in Millstone 3 SER Section 2.4B.1.

RAI 2.4-12, which is specific to Unit 2, is described below.

LRA Section 2.4.1 “Containment” references FSAR Section 5.9.3.3 for additional details about the containment post-tensioning system. FSAR Section 5.9.3.3.4, “Corrosion Protection,” states:

> As a result of the Millstone Unit No. 2 tendon surveillance program, sixteen horizontal tendons have been identified as subject to ground water intrusion. To prevent ground water intrusion, the corrosion protection material is continuously supplied to the subject tendons at a pressure slightly above hydrostatic pressure of the ground water. The tendons so pressurized are horizontal tendons 12H01 through 12H06, 12H08 through 12H10, 31H01 through 31H04, 31H01, 32H02, and 32H03.

In accordance with 10 CFR 54.4(a)(2), the system that continuously supplies corrosion protection material to the sixteen (16) horizontal tendons appears to serve an intended function. The applicant was requested to submit a scoping and screening evaluation and AMR for this system and, If applicable, to provide the technical basis for excluding this system from the scope of license renewal.

In its response to RAI 2.4-12, dated November 9, 2004, the applicant stated that:

> The safety-related containment post-tensioning system is in the scope of license renewal because it provides containment structural integrity. The post-tensioning system is composed of horizontal and vertical tendon wires and associated tendon anchorages that are used to prestress the cylindrical portion of the concrete Containment. Corrosion protection material (grease) is continuously applied as a preventative measure to prevent the intrusion of water into 16 horizontal hoop tendons that have been identified as subject to ground water intrusion. Failure to supply the corrosion protection material

to the tendons may allow ground water intrusion, but would not affect the tension on the containment tendons or the structural integrity of the Containment. Additionally, no credit is taken for corrosion protection of the containment tendons in the determination of aging effects. Loss of material was identified for the containment tendons and is managed with the Inservice Inspection Program: Containment Inspections AMP as indicated in LRA Table 3.5.2-1.

Therefore, since the pressurized application of corrosion protection material to the tendons is not required for containment structural integrity or to maintain proper tension of the tendons, and is not credited in the aging management review, it does not meet the criteria of 10 CFR 54.4(a)(2) for being included in the scope of license renewal.

Based on its review, the staff finds the applicant's response to RAI 2.4-12 acceptable because the post-tensioning system is in scope as indicated in LRA Table 3.5.2-1. The staff considers its concern described in RAI 2.4-12 resolved.

2.4A.1.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the containment that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the containment that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2 Structures and Component Supports

In LRA Section 2.4.2, the applicant identified the structures and components of the structures and component supports that are subject to an AMR for license renewal.

The applicant described the structures and component supports in the following sections:

- 2.4.2.1 Unit 2 containment enclosure building
- 2.4.2.2 Unit 2 auxiliary building
- 2.4.2.3 Unit 2 warehouse building
- 2.4.2.4 Unit 2 turbine building
- 2.4.2.5 Unit 1 turbine building
- 2.4.2.6 Unit 1 control room and radwaste treatment building
- 2.4.2.7 Unit 2 fire pump house
- 2.4.2.8 Unit 3 fire pump house
- 2.4.2.9 SBO diesel generator enclosure and fuel oil tank vault
- 2.4.2.10 Unit 2 condensate polishing facility and Warehouse No. 5
- 2.4.2.11 security diesel generator enclosure
- 2.4.2.12 stack monitoring equipment building
- 2.4.2.13 Millstone stack
- 2.4.2.14 switchyard control house
- 2.4.2.15 retaining wall

- 2.4.2.16 switchyard, 345kV
- 2.4.2.17 Unit 2 intake structure
- 2.4.2.18 sea walls
- 2.4.2.19 Unit 2 discharge tunnel and discharge structure
- 2.4.2.20 Unit 2 bypass line
- 2.4.2.21 tank foundations
- 2.4.2.22 yard structures

The corresponding subsections of this SER (2.4A.2.1 - 2.4A.2.22, respectively) present the staff's related findings.

2.4A.2.1 Unit 2 Containment Enclosure Building

2.4A.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.1, the applicant described the Unit 2 containment enclosure building. The Unit 2 containment enclosure building is a steel-framed structure, with metal siding and a roof deck. The enclosure building completely surrounds the containment above grade and is designed and constructed to limit radioactive leakage to the environment in the unlikely event of a loss-of-coolant accident (LOCA). The containment enclosure building also encloses the auxiliary building equipment areas (the east and west main steam and main feedwater penetration areas).

The containment enclosure building is a Class I structure. The containment enclosure building non-safety-related structural members support the function of safety-related equipment. The containment enclosure building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-1, the applicant identified the following Unit 2 containment enclosure building component types that are within the scope of license renewal and subject to an AMR: blow-off metal siding/panel; doors; equipment pads/grout; flood/spill barriers, including curbs, dikes, toe plates, and stop logs; metal siding; metal siding-caulking; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; scuppers; structural reinforced concrete (caisson, floor slabs, grade beams, slabs on grade, walls); structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking); and vent stacks (supports).

2.4A.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.1 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 containment enclosure building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.4A.2.1.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 containment enclosure building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 containment enclosure building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.2 Unit 2 Auxiliary Building

2.4A.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.2, the applicant described the Unit 2 auxiliary building. The Unit 2 auxiliary building includes the auxiliary building structure, spent fuel pool (including transfer canal), spent fuel storage racks, control room, and service water pipe tunnel. The auxiliary building structure is a multi-story, reinforced concrete structure founded on bedrock, with concrete floor slabs, roof slabs, and walls. Unit 1 control room steel columns support a portion of the auxiliary building structure in Unit 2. A steel frame structure, which is supported on the operating floor, supports the cask handling crane and the concrete roof slab, above the spent fuel pool. Steel platforms, stairs, grating, and ladders are provided inside the auxiliary building structure.

The Unit 2 auxiliary building is a Class I structure. The Unit 2 auxiliary building non-safety-related structural members support the function of safety-related equipment. The Unit 2 auxiliary building contains EQ equipment and supports fire protection, station blackout, and anticipated transient without scram.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides jet impingement shielding for HELBs
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides a pressure boundary
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-2, the applicant identified the following Unit 2 auxiliary building component types that are within the scope of license renewal and subject to an AMR: control room ceiling panels; control room ceiling supports; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; masonry block walls; metal siding; metal smoke barrier; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; neutron absorber elements; scuppers; sliding bearings; spent fuel pool gate; spent fuel pool gate-seal; spent fuel pool liner plates; spent fuel storage racks; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, slabs on grade, walls); structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking); sumps; and tunnel.

2.4A.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.2 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 auxiliary building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.2.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 auxiliary building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 auxiliary building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.3 Unit 2 Warehouse Building

2.4A.2.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.3, the applicant described the Unit 2 warehouse building**.** The Unit 2 warehouse building includes the warehouse building structure and associated diesel oil supply tank rooms, new fuel storage room, cask wash pit, emergency diesel generator rooms, and the pipe tunnel to the RWST. The warehouse building structure is a safety-related structure founded on compacted structural backfill. The structure is located on the east side of the auxiliary building and the containment enclosure building. Most of the warehouse building structure is a multi-story reinforced concrete structure. The cask-handling area has a higher roof, which is supported by a steel-framed structure with metal siding.

The Unit 2 warehouse building is a Class I structure. The Unit 2 warehouse building non-safety-related structural members support the function of safety-related equipment. The Unit 2 warehouse building contains EQ equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-3, the applicant identified the following Unit 2 warehouse building component types that are within the scope of license renewal and subject to an AMR: cask wash pit liner; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; masonry block walls; metal siding; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; missile barriers; new fuel racks assembly; scuppers; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls); structural steel (beams, columns and baseplates, concrete floor framing and decking, roof framing and decking); and tunnel.

2.4A.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.3 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 warehouse building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.3.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 warehouse building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 warehouse building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.4 Unit 2 Turbine Building

2.4A.2.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.4, the applicant described the Unit 2 turbine building. The Unit 2 turbine building is located west of the auxiliary building and the containment enclosure building, and north of the Unit 1 turbine building. The Unit 2 turbine building is a two-bay steel-framed multi-story structure with a high and low roof. The turbine building is enclosed with metal siding, blow-off metal siding/panels and pre-cast concrete panels, roof decking on the high roof, and concrete slab on the low roof. The foundations for the frames are spread-footing bearing on bedrock.

The Unit 2 turbine building is a Class I structure. The Unit 2 turbine building non-safety-related structural members support the function of safety-related equipment. The Unit 2 turbine building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides EQ barrier and/or HELB barrier
- provides jet impingement shielding for high energy line breaks

In LRA Table 2.4.2-4, the applicant identified the following Unit 2 turbine building component types that are within the scope of license renewal and subject to an AMR: blow-off metal siding/ panel; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; masonry block walls; metal siding; metal siding-caulking; miscellaneous steel [brackets, checkered plates, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; scuppers; sliding bearings; structural reinforced concrete (floor slabs, footing and grade beams, grade beams, pedestals, roof slabs, slabs on grade, spread footing, turbine pedestal, walls); structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking); sump liner; and sumps.

2.4A.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.4 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 turbine building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.4.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 turbine building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 turbine building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.5 Unit 1 Turbine Building

2.4A.2.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.5, the applicant described the Unit 1 turbine building. The Unit 1 turbine building is a seismic Class I and II structure. The Unit 1 turbine building north wall is common with the safety-related Unit 2 turbine building. Protection from external flooding on the Unit 2 turbine building south side is provided by the Unit 1 turbine building.

The Unit 1 turbine building provides support for the safety-related Unit 2 turbine building. The Unit 1 turbine building non-safety-related structural members provide flood protection for the south side of the Unit 2 turbine building.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-5, the applicant identified the following Unit 1 turbine building component types that are within the scope of license renewal and subject to an AMR: h-piles; scuppers; sliding bearings; structural reinforced concrete (floor slabs, foundation mat slabs, walls); and structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking).

2.4A.2.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.5 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 1 turbine building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.5.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 1 turbine building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 1 turbine building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.6 Unit 1 Control Room and Radwaste Treatment Building

2.4A.2.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.6, the applicant described the Unit 1 control room and radwaste treatment building. The Unit 1 control room and radwaste treatment building is a Seismic Class I and II structure with a foundation mat on bedrock. The building includes a below-grade reinforced concrete structure with the control room located above grade. The control room is constructed of reinforced concrete walls with a two-foot-thick reinforced concrete roof.

The Unit 1 control room and radwaste treatment building provides support for the safety-related Unit 2 auxiliary building's structure. The Unit 1 control room and radwaste treatment building non-safety-related structural members provide flood protection. The Unit 1 control room and radwaste treatment building also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier

In LRA Table 2.4.2-6, the applicant identified the following Unit 1 control room and radwaste treatment building component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (brackets, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.)); sliding bearings; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls); and structural steel (beams, columns and baseplates).

2.4A.2.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.6 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 1 control room and radwaste treatment building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.6.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant.

No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 1 control room and radwaste treatment building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 1 control room and radwaste treatment building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.7 Unit 2 Fire Pump House

2.4A.2.7.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.7, the applicant described the Unit 2 fire pump house. The Unit 2 fire pump house is supported on a reinforced concrete mat foundation with reinforced masonry walls and structural steel beams supporting the roof. The roof is made up of a 4-inch-thick concrete slab over metal decking.

The Unit 2 fire pump house supports fire protection.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-7, the applicant identified the following Unit 2 fire pump house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete (foundation mat slabs, roof slabs); and structural steel (roof framing and decking).

2.4A.2.7.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.7 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 fire pump house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.7.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 fire pump house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 fire pump house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.8 Unit 3 Fire Pump House

2.4A.2.8.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.8, the applicant described the Unit 3 fire pump house. The Unit 3 fire pump house consists of a reinforced concrete mat foundation with reinforced masonry walls and structural steel beams supporting the roof. The roof is made up of a 4-inch-thick concrete slab over metal decking.

The Unit 3 fire pump house supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-8, the applicant identified the following Unit 3 fire pump house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; masonry block walls; structural reinforced concrete (foundation mat slabs, roof slabs); and structural steel (roof framing and decking).

2.4A.2.8.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.8 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 fire pump house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.8.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 fire pump house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 fire pump house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.9 SBO Diesel Generator Enclosure and Fuel Oil Tank Vault

2.4A.2.9.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.9, the applicant described the station blackout (SBO) diesel generator enclosure and fuel oil tank vault. The SBO diesel generator enclosure includes the SBO diesel generator switchgear enclosure, the concrete pad that supports the SBO diesel generator exhaust, and the separate building that provides support and shelter for the SBO diesel.

The SBO diesel generator enclosure and fuel oil tank vault supports fire protection and station blackout.

The intended function within the scope of license renewal includes providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-9, the applicant identified the following SBO diesel generator enclosure and fuel oil tank vault component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (checkered plates); roofing; siding; structural reinforced concrete (foundation mat slabs); and structural steel (beams, bracing).

2.4A.2.9.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.9 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the SBO diesel generator enclosure and fuel oil tank vault described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.9.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the SBO diesel generator enclosure and fuel oil tank vault that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SBO diesel generator enclosure and fuel oil tank vault that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.10 Unit 2 Condensate Polishing Facility and Warehouse No. 5

2.4A.2.10.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.10, the applicant described the Unit 2 condensate polishing facility and Warehouse No. 5. The Unit 2 condensate polishing facility is a non-safety-related, non-seismic structure located in Warehouse No. 5, which also houses Unit 3 fire protection piping. Unit 2 shares this warehouse with Unit 3. The structure is located north of the Unit 2 turbine building and has a reinforced concrete mat foundation founded on structural fill. The Unit 2 condensate polishing facility is located approximately 20 feet below grade. There are three main levels and a penthouse that is located in the middle of the structure near the west wall. The superstructure is a steel-framed structure and some areas of the structure have masonry walls.

The Unit 2 condensate polishing facility and Warehouse No. 5 supports station blackout and fire protection.

The intended function within the scope of license renewal includes providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-10, the applicant identified the following Unit 2 condensate polishing facility and Warehouse No. 5 component types that are within the scope of license renewal and subject to an AMR: masonry block walls; miscellaneous steel (platforms and grating); structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls); and structural steel (beams, bracing, columns and baseplates).

2.4A.2.10.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.10 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 condensate polishing facility and Warehouse No. 5 described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.10.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 condensate polishing facility and Warehouse No. 5 that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 condensate polishing facility and Warehouse No. 5 that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.11 Security Diesel Generator Enclosure

2.4A.2.11.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.11, the applicant described the security diesel generator enclosure. The security diesel generator enclosure is a non-safety-related, non-seismic, one-story free-standing structure that houses the security diesel generator and its support equipment, including the security diesel fuel oil tank. Power from the security diesel generators is used for general exterior illumination that is credited for fire protection events. The structure is constructed with aluminum sheeting riveted to a combination of aluminum and steel frame. The walls and roof are insulated and lined with plywood on the inside. The building is above grade, is supported by steel channels, and sits on a concrete slab foundation. Power cables and conduits from the generator are supported from the ceiling and internal wall surfaces of the structure.

The security diesel generator enclosure supports fire protection.

Intended functions provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-11, the applicant identified the following security diesel generator enclosure component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (checkered plates); roofing; siding; structural framing; structural reinforced concrete (foundation mat slabs); and structural steel (beams, bracing).

2.4A.2.11.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.11 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the security diesel generator enclosure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.11.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the security diesel generator enclosure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the security diesel generator enclosure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.12 Stack Monitoring Equipment Building

2.4A.2.12.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.12, the applicant described the stack monitoring equipment building. The stack monitoring equipment building is a non-safety-related, non-seismic, single-story structure that provides support and shelter to non-safety-related equipment that can affect safety-related equipment. The building has a concrete roof and floor slab on grade with non-reinforced grouted masonry walls that are supported on a concrete spread footing.

The stack monitoring equipment building non-safety-related structural members support the function of safety-related equipment.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-12, the applicant identified the following stack monitoring equipment building component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; and structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls).

2.4A.2.12.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.12 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the stack monitoring equipment building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.12.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the stack monitoring equipment building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the stack monitoring equipment building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.13 Millstone Stack

2.4A.2.13.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.13, the applicant described the stack. The stack is a safety-related reinforced-concrete structure supported on a reinforced concrete mat foundation. The stack extends 375 feet above grade and has a circular orifice with a 7 foot inside diameter. The stack is a Class I structure.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier

In LRA Table 2.4.2-13, the applicant identified the following stack component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (floor slabs, foundation mat slabs, walls); and structural steel (beams, bracing).

2.4A.2.13.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.13 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the stack described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.13.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the stack that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the stack that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.14 Switchyard Control House

2.4A.2.14.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.14, the applicant described the switchyard control house. The switchyard control house is a non-safety-related, non-seismic, one-story building that provides support and shelter for equipment utilized for closure of the 345kV circuit breakers that are credited for restoration of offsite power in the event of a station blackout.

The switchyard control house supports station blackout.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-14, the applicant identified the following switchyard control house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete; and structural steel.

2.4A.2.14.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.14 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the switchyard control house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.14.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the switchyard control house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the switchyard control house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.15 Retaining Wall

2.4A.2.15.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.15, the applicant described the retaining wall. The retaining wall is a non-safety-related, non-seismic, reinforced concrete wall supported on reinforced concrete footing that is adjacent to the Unit 2 condensate polishing facility and Warehouse No. 5.

The retaining wall supports station blackout.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-15, the applicant identified the following retaining wall component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (footing, walls).

2.4A.2.15.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.15 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the retaining wall described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.15.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the retaining wall that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the retaining wall that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.16 Switchyard, 345kV

2.4A.2.16.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.16, the applicant described the 345kV switchyard. Structural members associated with the in-scope electrical equipment required for the restoration of offsite power include transmission towers and dead-end structures and associated foundations, breaker and disconnect foundations and support structures, the non-safety-related, non-seismic, reserve station service transformer foundation, and the A700 switchgear enclosure and foundation.

The 345kV switchyard structural members supports station blackout.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-16, the applicant identified the following 345kV switchyard component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete and structural steel.

2.4A.2.16.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.16 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the 345kV switchyard described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.16.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the 345kV switchyard that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the 345kV switchyard that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.17 Unit 2 Intake Structure

2.4A.2.17.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.17, the applicant described the Unit 2 intake structure. The Unit 2 intake structure is a Class I reinforced concrete structure located west of the main plant. The structure consists of four individual bays that provide sea water from the Niantic Bay to four non-safety-related circulating water pumps. Three of the four bays also supply water to three safety-related service water pumps for the purpose of emergency and normal heat removal from heat exchangers and equipment. The service water (SW) system is the only safety-related system located in the Unit 2 intake structure.

The Unit 2 intake structure is a Class I structure (SW cubicles only) that provides a source of cooling water to the safety-related SW pumps. The Unit 2 intake structure non-safety-related structural members support the function of safety-related equipment. The Unit 2 intake structure also supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides a source of cooling water for plant shutdown

In LRA Table 2.4.2-17, the applicant identified the following Unit 2 intake structure component types that are within the scope of license renewal and subject to an AMR: doors; equipment pads/grout; hatches; miscellaneous steel [checkered plates, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating]; missile barriers; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls); structural steel (beams, bracing, roof framing and decking); and trash racks.

2.4A.2.17.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.17 and the referenced Millstone FSAR sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 intake structure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.4.17 identified one area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. Therefore, the staff issued RAI 2.4-6, to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1). The staff’s RAI is described below.

- The LRA stated that the trash racks for the Unit 2 intake structure were within the scope of license renewal and referenced FSAR Section 5.6 for further details. The staff reviewed this FSAR section and could not identify the trash racks on FSAR Figure 5.6-1. This figure did not identify a course screen guide and a fine screen guide. The staff requested whether these two guides were the same as the trash racks referred to in the LRA. If not, the applicant was requested to identify the location of the trash racks on FSAR Figure 5.6-1 and clarify whether the course screen and fine screen guides were within the scope of license renewal. If not, the applicant was requested to explain why not.

- The LRA stated that the traveling screens for the Unit 2 intake structure were not in the scope of license renewal because they did not perform an intended function. FSAR Section 9.7.2.2.1 stated that the SW pumps took suction downstream from the traveling screens in the intake structure. This configuration was also illustrated in FSAR Figure 5.6-1. The applicant was requested to provide the technical basis for the conclusion that the traveling screens were not within the scope of license renewal.
- FSAR Figure 5.6-1 identified four sluice gates located on the north face of the intake structure. These sluice gates appeared to be located in the recirculation distribution box on the intake structure wall as shown on FSAR Figure 5.6-2 and apparently were associated with the operation of the Unit 2 bypass line discussed in LRA Section 2.4.2.20. The applicant was requested to clarify whether these sluice gates were within the scope of license renewal. If they were, the applicant was requested to identify where they were included in LRA Table 2.4.2-17. If they were not, the applicant was requested to explain why not.

In its response to RAI 2.4-6, dated November 9, 2004, the applicant stated:

- FSAR Figure 5.6-1 identifies a course screen guide and a fine screen guide. The course screen guide is installed for the trash racks. The course screen guide is within the scope of license renewal and inspected as part of the trash rack assembly. The fine screen and guide are not within the scope of licensee renewal because the fine screen is not utilized.
- The traveling screens are part of the non-safety-related circulating water system that supports normal plant operation. During normal plant operation, the circulating water pumps draw a significant flow of cooling water through the bays of the intake structure to support the main condenser cooling requirements. The flow velocity during normal plant operation is approximately 1.0 ft/sec. This flow rate creates the potential for debris and sediment to enter the bays. During emergency operation when the circulating water pumps are not in operation, the service water pumps draw a small amount of cooling water through the bays with a low flow velocity (approximately 0.09 ft/sec). The low flow velocity will create an insignificant amount of debris and sediment and the traveling water screens will be able to pass sufficient amount of cooling water to the service water pumps to allow for safe shutdown. The service water pumps also have their own discharge strainers to filter out small debris and vegetation. Therefore, the traveling screens do not provide a license renewal intended function as defined in 10 CFR 54.4(a)(1), (2) or (3) and are not in scope for license renewal.
- The sluice gates consist of a frame, guides, and sliding gate installed in the concrete chamber walls. These component parts are the equivalent of valve internals and have been determined to be active components. However, the sluice gate is not configured with a housing in a manner similar to a valve body. Therefore, although the sluice gates are in the scope of license renewal, they are active components that do not require aging management review, and are not included in LRA Table 2.4.2-26.

Based on its review, the staff finds the applicant’s response to RAI 2.4-6 acceptable, because the applicant has adequately clarified its scoping and screening evaluation for the screen guides, traveling screens, and sluice gates. The staff considers its concern described in RAI 2.4-6 resolved.

2.4A.2.17.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 intake structure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 intake structure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.18 Sea Walls

2.4A.2.18.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.18, the applicant described the sea walls. The shores immediately north and south of the Unit 2 intake structure are protected from erosion by post-tensioned, reinforced concrete sea walls. The walls are supported by a reinforced concrete footing, which is founded upon bedrock. The top of the walls are approximately 14 feet above mean sea level.

The concrete sea walls are safety-related structures protecting the structural integrity of the safety-related Unit 2 intake structure.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-18, the applicant identified the following sea walls component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete and structural steel.

2.4A.2.18.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.18 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the sea walls described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.18 identified one area in which additional information is necessary to complete the review of the applicant's scoping and screening results. Therefore, the staff issued RAI 2.4-7, to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1).

In RAI 2.4-7, the staff noted that LRA Section 2.4.2.18 for Millstone 2 discussed the scoping and screening results for the sea walls. The LRA stated that the walls are post-tensioned, reinforced concrete sea walls. FSAR Section 2.5.4.2.1 stated that the anchorage system for the walls consists of 5 to 11 strands, consisting of 7 wires per strand, which are anchored into bedrock by drilling and grouting. It also stated that the anchorages are encased in concrete. A typical anchorage was shown in FSAR Figure 2.5-15. LRA Table 2.4.2-18 stated that the sea wall structural members that require aging management review were "structural reinforced concrete (footing, walls)." The applicant was requested to clarify whether the wall anchorage system shown in FSAR Figure 2.5-15 was also within the scope of license renewal and included as part of the item listed in LRA Table 2.4.2-18. If it was not, that applicant was requested to explain why not.

In its response to RAI 2.4-7, dated November 9, 2004, the applicant stated that:

> The sea wall anchorage functions to maintain the integrity of the sea wall and is in the scope of license renewal. The sea wall anchorage was inadvertently omitted from LRA Table 2.4.2-18 and Table 3.5.2-19. The sea wall anchorage system, consisting of the anchorage strands, has been evaluated for the effects of aging. The carbon steel anchor strands are anchored in rock by drilling and grouting. The unbonded length of the steel strands is located within a polyvinyl chloride (PVC) pipe that is completely grouted following the post-tensioning operation. The anchorage system is located in the center of the 4-foot thick reinforced concrete sea wall. The concrete, in addition to the grout and PVC pipe, provides ample protection such that the anchorage system is not exposed to an aggressive environment. Therefore, the aging management review concluded that there are no aging effects requiring management of the anchorage system.

Based on its review, the staff finds the applicant's response to RAI 2.4-7 acceptable from the scoping and screening perspective. The staff considers its concern described in RAI 2.4-7 resolved based on the inclusion of the component.

2.4A.2.18.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the sea walls that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the sea walls that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.19 Unit 2 Discharge Tunnel and Discharge Structure

2.4A.2.19.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.19, the applicant described the Unit 2 discharge tunnel and discharge structure. The SW and circulating water systems discharge into the discharge tunnel. The discharge tunnel is a non-safety-related reinforced concrete structure that is located below grade. It extends from the turbine building to the rock quarry.

The discharge structure, a continuation of the discharge tunnel, is located at the end of the discharge tunnel. It is a reinforced concrete structure with a portion of the structure below grade and a portion exposed to atmosphere and weather. At the discharge structure, SW is discharged to a rock quarry. From the quarry, the water passes through a channel into Long Island Sound.

The Unit 2 discharge tunnel and discharge structure are non-safety-related structures whose failure could affect the discharge path for the safety-related SW system.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a pressure boundary

In LRA Table 2.4.2-19, the applicant identified the following Unit 2 discharge tunnel and discharge structure component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (floor slabs, roof slabs, walls).

2.4A.2.19.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.19 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 discharge tunnel and discharge structure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.19.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 discharge tunnel and discharge structure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 discharge tunnel and discharge structure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.20 Unit 2 Bypass Line

2.4A.2.20.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.20, the applicant described the Unit 2 bypass line. A non-safety-related bypass line is provided from the discharge tunnel to the Unit 2 intake structure to provide for de-icing at the intake, if required.

The Unit 2 bypass line is a non-safety-related structure whose failure could allow the formation of ice to occur in front of the Unit 2 intake structure, thus blocking flow to the safety-related SW system.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)

In LRA Table 2.4.2-20, the applicant identified the following Unit 2 bypass line component type that is within the scope of license renewal and subject to an AMR: pipe.

2.4A.2.20.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.20 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 bypass line described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.20.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 bypass line that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 bypass line that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.21 Tank Foundations

2.4A.2.21.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.21, the applicant described the tank foundations. The following foundations are within the scope of the license renewal:

- Unit 2 condensate storage tank foundation and missile barrier
- fire water tanks 1 and 2 foundations
- Unit 2 diesel fuel oil storage tank foundation
- Unit 2 refueling water storage tank foundation
- SBO diesel fuel oil storage tank foundation

The condensate storage tank foundation and missile barrier provides support for the safety-related condensate storage tank. Fire water tanks 1 and 2 foundations support fire protection. The diesel fuel oil storage tank foundation supports the in-scope diesel fuel oil storage tank. The refueling water storage tank foundation qualifies as a Class 1 structure. The SBO diesel fuel oil storage tank foundation supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier

In LRA Table 2.4.2-21, the applicant identified the following tank foundations component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (brackets, ladders, platforms and grating); structural reinforced concrete (foundation mat slabs, walls); structural reinforced concrete (footing); structural reinforced concrete; structural reinforced concrete (foundation mat slabs); and structural reinforced concrete (foundation mat slabs).

2.4A.2.21.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.21 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the tank foundations described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.21.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the tank foundations that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the tank foundations that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.2.22 Yard Structures

2.4A.2.22.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.22, the applicant described the yard structures. The following structures are within the scope of the license renewal:

- Unit 2 transformer firewalls and dikes
- A700 switchgear enclosure dike
- Unit 2 diesel fuel oil storage tank dike
- Unit 2 refueling water storage tank (RWST) valve pit
- Unit 2 pipe trenches
- Unit 2 manholes
- Unit 2 duct banks
- Unit 2 security lighting supports (including poles)

The transformer firewalls and dikes, diesel fuel oil storage tank dike, and the security lighting supports (including poles) supports fire protection. The A700 switchgear enclosure dikes supports station blackout. The RWST valve pit is Class 1 structure that provides enclosure and protection for safety-related piping associated with the RWST. The pipe trenches provides protection for safety-related condensate pipe from the storage tank to the auxiliary feedwater pumps; the pipe trenches also supports fire protection and station blackout. The manholes contain electrical cables for safety-related, in-scope equipment; other in-scope manholes support fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-22, the applicant identified the following yard structures component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (footing, walls); doors; structural reinforced concrete; flood/spill barriers including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (footing); structural steel (beams); manhole covers; structural reinforced concrete (foundation mat slabs, roof slabs, walls); hatches; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.)]; structural reinforced concrete (foundation mat slabs, walls); manhole covers; structural reinforced concrete (foundation mat slabs, roof slabs, walls); duct banks; lighting poles; miscellaneous steel (embedded steel-exposed surfaces (shapes, plates, unistrut, etc.)); and structural reinforced concrete (footing).

2.4A.2.22.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.22 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the yard structures described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.2.22.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the yard structures that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the yard structures that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.3 NSSS Equipment Supports

2.4A.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.3, the applicant identified the components of the NSSS equipment supports that are subject to an AMR for license renewal. The NSSS equipment supports are the plant components that support and restrain the following reactor coolant system equipment:

- reactor vessel
- reactor coolant pumps
- steam generators
- pressurizer

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-23, the applicant identified the following NSSS equipment supports component types that are within the scope of license renewal and subject to an AMR: pressurizer support - bolting; reactor coolant pump support - plate and structural shapes, spring hanger assemblies; reactor vessel support - bolting, plate and structural shapes; sliding support assembly; steam generator support - sliding support assembly, bolting, plate and structural shapes, sliding base, and snubber attachment hardware.

2.4A.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the NSSS equipment supports described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.3.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the NSSS equipment supports that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the NSSS equipment supports that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.4 General Structural Supports

2.4A.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.4, the applicant identified the components of the general structural supports that are subject to an AMR for license renewal. Structural supports for mechanical and electrical components are an integral part of all plant systems. Many of these supports are not uniquely identified with component identification numbers. However, characteristics of the supports, such as design, materials of construction, environments, and anticipated stressors, are similar. Therefore, structural supports for mechanical and electrical components are evaluated as commodities across system boundaries.

Structural supports protect and support equipment. Non-safety-related supports prevent interaction between safety-related and non-safety-related components. Other supports provide support for components credited for fire protection, station blackout, anticipated transient without scram, pressurized thermal shock, or environmental qualification of electrical equipment.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-24, the applicant identified the following general structural supports component types that are within the scope of license renewal and subject to an AMR: battery racks; electrical conduit, cable trays; sliding support bearing and sliding surfaces; structural support components (plate, structural shapes, etc.); and vendor-supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.).

2.4A.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the general structural supports described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.4.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the general structural supports that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the general structural supports that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.5 Miscellaneous Structural Commodities

2.4A.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.5, the applicant identified the components of the miscellaneous structural commodities that are subject to an AMR for license renewal. Miscellaneous structural commodities are within the scope of license renewal because they provide safety-related functions, by supporting safety-related component functions, and/or by supporting environmental qualification, fire protection, station blackout, anticipated transient without scram, and pressurized thermal shock regulations.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides EQ barrier and/or HELB barrier
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a pressure boundary
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-25, the applicant identified the following miscellaneous structural commodities component types that are within the scope of license renewal and subject to an AMR: bus duct enclosures; cable tray cover and assembly; electrical component supports within cabinets and panels; enclosure; expansion joint/seismic gap material (between adjacent buildings/structures); expansion joint/seismic gap material (fire-rated walls); fire boots; fire doors and/or eq barrier doors; fire resistant coating; fire stops; fire-rated cable wraps; fire/eq barrier penetration seals (including ceramic damming material); flood door/gate gasket; flood doors/gates; flood prevention plugs; gaskets in junction, terminal, and pull boxes; gypsum boards; junction, terminal, and pull boxes; panels and cabinets; radiant energy shields; stop log; stop log brackets; stop log gasket; switchgear enclosures; watertight door gasket; and watertight doors.

2.4A.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.5 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the miscellaneous structural commodities described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.5.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine

whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the miscellaneous structural commodities that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the miscellaneous structural commodities that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4A.6 Load Handling Cranes and Devices

2.4A.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.6, the applicant identified the components of the load handling cranes and devices that are subject to an AMR for license renewal. The load handling cranes and devices are within the scope of license renewal because certain load handling cranes and devices are Seismic Class I and meet, or are seismically designed and meet to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-26, the applicant identified the following load handling cranes and devices component types that are within the scope of license renewal and subject to an AMR: cranes and monorails including bridge and trolley support members (girders, beams, angles, frames, plates, rails & anchorage); fuel elevator support members (structural plates, tracks & anchorage); and fuel transfer machine and tilting mechanism support members (structural frame, tracks, and anchorage).

2.4A.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.6 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the load handling cranes and devices described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4A.6.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine

whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the load handling cranes and devices that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the load handling cranes and devices that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B Unit 3 Scoping and Screening Results - Structures

2.4B.1 Containment

2.4B.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.1, the applicant identified the components of the containment that are subject to an AMR for license renewal. The containment is a seismic Category I structure, housing the reactor, NSSS equipment, and various safety-related and non-safety-related components. The evaluation boundary of the containment consists of the containment structure, including the liner and internal structural members, and containment penetrations (equipment access and personnel air lock openings, piping penetrations, electrical penetrations, and the fuel transfer tube assembly). The refueling cavity liner and reactor cavity seal ring are also included in the containment evaluation boundary.

The containment is a Seismic Category I structure. The containment non-safety-related structural members support the function of safety-related equipment. The containment also contains EQ equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a pressure boundary
- provides EQ barrier and/or HELB barrier
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides jet impingement shielding for high energy line breaks
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)

In LRA Table 2.4.1-1, the applicant identified the following containment component types that are within the scope of license renewal and subject to an AMR: concrete blocks (shielding); containment liner; containment recirculation sump; containment recirculation sump screen; containment recirculation sump vortex breaker; containment shell (cylindrical wall and dome);

door locking mechanism; electrical penetrations; equipment hatch; equipment pads/grout; expansion bellows; flood/spill barriers including curbs, dikes, toe plates, and stop logs; fuel transfer tube; fuel transfer tube enclosure protection shield; fuel transfer tube gate valve; fuel transfer tube penetration; gaskets; hatches; hinges and pins; jet impingement barriers; mechanical penetrations; miscellaneous steel [brackets, checkered plates, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.), ladders, platforms and grating, stairs]; missile barriers; moisture barrier; o-rings; personnel air lock; pipe; reactor cavity seal ring; refueling cavity liner; ring girder; spare penetrations; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls); structural steel (beams, bracing, columns and baseplates, trusses); sub-foundation; and valve bodies.

2.4B.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.1 and the referenced Millstone FSAR Sections 3.8.1.1, 3.8.1.1.4, 3.8.1.1.5, 3.8.3, Table 3.2-1, Figure 3.8-20, Figure 3.8-21, and Figure 3.8-22. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the containment described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.4.1 identified several areas in which additional information was necessary to complete the review of the applicant’s scoping and screening results. Therefore, the staff issued RAIs 2.4-4, 2.4-5, 2.4-8, and 2.4-13 to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1).

The staff’s RAI 2.4-4 is described below.

In both the Millstone 2 and Millstone 3 LRAs, Table 2.4.1-1 “Unit X Containment” lists “pipe” and “valve bodies” under the ”Structural Member” column. In both LRAs, Section 2.4.1 “Containment” does not specifically describe these items. The applicant was requested to describe the pipe and valve bodies that are included as part of the Millstone 2 and 3 containments.

In its response to RAI 2.4-4, dated November 9, 2004, the applicant stated that:

> LRA Section 2.4.1, Containment, describes the personnel lock, which allows for access into and out of the Containment. The personnel lock includes an equalizing system to equalize pressure inside and outside the lock. This function is accomplished through the use of piping and valves. In LRA Table 3.5.2-1, a note is assigned to the Structural Members "Pipe" and "Valve Bodies" which states that these components are related to the personnel lock equalizing system.

Based on its review, the staff finds the applicant’s response to RAI 2.4-4 acceptable, because it clearly describes the pipe and valve bodies that are included as part of the Millstone 2 and 3 containments. The staff considers its concern described in RAI 2.4-4 resolved.

The staff's RAI 2.4-5 is described below.

In both the Millstone 2 and Millstone 3 LRAs, Section 2.4.1 "Containment" describes containment electrical penetrations as follows:

> The electrical penetrations consist of an electrical penetration module installed into a penetration sleeve that is welded to the liner plate. The evaluation boundary consists of the sleeve and attachment weld to the electrical penetration module. Spare electrical penetrations are also part of the evaluation boundary. The electrical penetration module is evaluated as described in Section 2.5.2, Electrical Penetrations.

LRA Section 2.5.2 "Electrical Penetrations" states:

> Electrical penetrations permit the conduction of electrical power or signals through the Containment wall while maintaining the integrity of the Containment pressure boundary. The electrical penetration feed-through modules consist of one or more electrical conductors in a tubular metallic cylinder. The cylinder passes through a header plate which is manufactured with an adapter ring that is field-welded to the Containment penetration sleeve to provide the Containment pressure boundary. The header plate may contain one or more modules that make up the total electrical penetration assembly. The modules contain conductor extensions, conductor supports, and seals which are either epoxy, O-ring, or mechanical compression seals. Nitrogen is used for monitoring of seal pressure integrity.

From the information provided in the LRAs, it appears that the AMR for the containment pressure boundary function of the electrical penetration feed-through modules is evaluated as part of the electrical scope, instead of as part of the structures scope. The staff considers the containment pressure boundary function of the electrical penetration feed-through modules to be part of the structures scope. The applicant was requested to submit an AMR for the containment pressure boundary function of electrical penetration feed-through modules as part of the structures scope.

In its initial response to RAI 2.4-5, dated November 9, 2004, the applicant stated:

> The evaluation boundaries for the containment electrical penetrations are described in LRA Sections 2.4.1 and 2.5.2 and the aging management review results are provided in LRA Tables 3.5.2-1 and 3.6.2-2. The information provided in these sections meets the requirements of 10 CFR 54.21(a). Therefore, no changes to the LRA are deemed necessary.

In its supplemental response to RAI 2.4-5, dated December 3, 2004, the applicant stated:

> Supplemental Information:
>
> In a November 9, 2004, telephone conversation, the staff requested further clarification of the containment pressure boundary function and the aging management review results for the electrical penetration feed-through modules. In addition, the staff

requested that Dominion provide the basis that there is no aging management program for the portion of the electrical penetration modules that provide the containment pressure boundary function, or provide an aging management program for these components.

As described in LRA Section 2.5.2, the electrical penetration feed-through module is installed in a containment structure penetration by field welding the module header plate to the containment liner via an adapter ring. The sleeve and weld are further described in LRA Section 2.4.1. The electrical penetration module, header plate, adapter, and sleeve, and the associated field weld, provide a containment pressure boundary function. The module, including non-metallic penetration seals, compression connectors, and feed-through sealants, and the header plate are evaluated for the effects of aging based on the containment pressure boundary function as indicated in LRA Table 3.6.2-2. The containment penetration sleeve, adapter, and associated welds are evaluated for the effects of aging based on the containment pressure boundary function as Electrical Penetrations and the results are provided in LRA Table 3.5.2-1.

As indicated in LRA Table 3.5.2-1, the electrical penetrations were determined to be subject to loss of material and are managed for the effects of aging by the Inservice Inspection Program: containment Inspections AMP. This AMP is described in LRA Section B2.1.16 and is modified by the response to RAI 3.5-1 provided in Dominion letter SN 04-673 dated 11/9/04.

After further consideration, and in response to NRC staff concerns, the aging management review results provided in LRA Table 3.6.2-2 for the Feed-through Sealant and the Penetration Seals component types are supplemented to indicate that the aging effects of cracking and change of material properties will be managed by the Inspection Program: Containment Inspections AMP as modified by the response to RAI 3.5-1 provided in Dominion letter SN 04-673 dated 11/9/04.

Based on its review, the staff finds the applicant’s response to RAI 2.4-5 acceptable, because the applicant has committed to inspect electrical penetration feed-through modules for cracking and change in material properties under its inspection program: containment inspections AMP, as modified by the response to RAI 3.5-1 provided in Dominion letter SN 04-673 dated November 9, 2004. The staff considers its concern described in RAI 2.4-5 resolved.

The staff’s RAI 2.4-8 is described below.

LRA Section 2.4.1 for Millstone 3 discusses the scoping and screening results for the containment. The LRA states that a seismic Category 1 reinforced concrete ring girder encircles the containment structure to prevent postulated sliding of rock wedges toward the containment wall during a seismic event. LRA Table 2.4.1-1 identifies the ring girder as requiring an AMR and LRA Table 3.5.2-1 presents the AMR results for the concrete structural members of the ring girder. FSAR Section 3.8.1.1.5 states that the ring girder is isolated from the containment wall by a compressible material. FSAR Figures 3.8-1, 3.8-23, and 3.8-24 identify the following components between the ring girder and the containment wall: compressible material, waterproofing membrane, protection board, ribbed fiberglass and waterstop. Some applicable components such as moisture barrier and expansion joint/seismic gap material (between adjacent buildings/structures) are generally identified in LRA Tables 2.4.1-1 and 2.4.2-36 as requiring an AMR. Please clarify whether all the components between the ring girder and the containment wall that are identified in FSAR Figures 3.8-1, 3.8-23, and 3.8-24 are within the scope of license renewal. If so, please identify where they are included in LRA Tables 2.4.1-1 and 2.4.2-36.

In its response to RAI 2.4-8, dated November 9, 2004, the applicant stated:

> The components listed in RAI 2.4-8, that are located between the ring girder and the containment wall, are identified in FSAR Figures 3.8-1, 3.8-23, and 3.8-24. They include: compressible material, waterproofing membrane, protection board, ribbed fiberglass, and waterstop. Of these, only the ribbed fiberglass material and the waterstops are within the scope of license renewal and subject to aging management review as described below.
>
> The compressible material was installed during construction to maintain a separation gap between the ring girder and the containment structure. The gap material also functioned as a gap filler to prevent debris from entering this gap until the adjacent building floors were constructed. With these floors in place, there is no possibility of debris entering the gap between the ring girder and the containment structure, and the gap filler material no longer serves a function. Therefore, the compressible material is not within the scope of license renewal.
>
> The waterproofing membrane is installed to minimize the effects of groundwater on the containment walls and foundation. However, the membrane is known to be breached and, when groundwater penetrates or otherwise circumvents the membrane, the water drains to an underdrains removal system that includes a layer of porous concrete beneath the containment and engineered safety features (ESF) building foundations. As such, failure of the waterproof membrane does not affect the structural integrity of the containment structure or liner. Therefore, the waterproof membrane does not perform a license renewal intended function and is not within the scope of license renewal.
>
> The protection board was placed during construction of the containment and ring girder structures to protect the waterproofing membrane. This component no longer serves a function and is not within the scope of license renewal.
>
> The ribbed fiberglass was placed in sheets against the outside wall of the containment structure during construction to provide an intentional space for flow of any groundwater leaking through the waterproofing membrane down to the underdrains removal system. Although it is considered unlikely that this flowpath would not be maintained even in the event of failure of the ribbed fiberglass sheets, these components were included within the scope of license renewal and subjected to an aging management review. As a result, the fiberglass material has been evaluated for the effects of aging in an air and a water environment. There are no applicable aging effects in these environments and there is no requirement to apply an aging management program for these components.
>
> Waterstops are included within the scope of license renewal and are subject to aging management review as part of the concrete structural member with which they are associated as described in LRA Appendix C, Section C2.4.

Based on its review, the staff finds the applicant’s response to RAI 2.4-8 acceptable. The staff considers its concern described in RAI 2.4-8 resolved.

The staff's RAI 2.4-13 is described below.

Millstone 3 LRA Sections 2.4.1 and 2.4.2.7, identify the presence of a porous concrete subfoundation that is founded on bedrock, under the containment structure and part of the ESF building. LRA Tables 2.4-1and 2.4.2-7 list "subfoundation" as a component type subject to aging management review. LRA Section 2.3.3.51 "Reactor Plant Aerated Drains System" states:

> In addition, the Reactor Plant Aerated Drains System includes the Engineered Safety Features Building porous concrete groundwater sump that collects groundwater and prevents it from adversely affecting the Containment or imparting hydrostatic pressure on the Containment liner. The sump pump discharges the collected groundwater to the groundwater underdrains storage tank located in the yard.
>
> The Reactor Plant Aerated Drains System provides Containment pressure boundary integrity, collection and removal of groundwater from the ESF building underdrains and porous concrete.
>
> The evaluation boundary of the Reactor Plant Aerated Drains System includes piping and components that provide for collection and removal of groundwater from the ESF Building underdrains and porous concrete, and those components that provide an isolation boundary for the service water pump cubicles and the Supplemental Leak Collection and Release System. The evaluation boundary also includes components that are spatially oriented near safety-related equipment in the Auxiliary Building, ESF Building, Control Building, and structure.

LRA Table 2.3.3-48 lists the "groundwater sump" as a component type subject to aging management review for the reactor plant aerated drains system.

The staff reviewed referenced Millstone 3 FSAR Sections 1.2.3, 3.8.1, 3.8.1.1, 3.8.3, 9.3.3 and Table 3.2-1. The staff also reviewed other applicable FSAR Sections 1.8, 2.5.4.6.1, 3.4.1.2, 3.8.1.6.4, 3.8.5.1, 3.8.5.6, 9.3.3.1, 9.3.3.2.4, 9.3.3.2.4.1, 9.3.3.3, and 9.3.3.4, in order to better understand the porous concrete subfoundation and its intended function, and the components of the reactor plant aerated drains system that are essential to accomplish this intended function. The staff identified a number of other structural and mechanical components, in addition to the porous concrete subfoundation and the porous concrete groundwater sump, that appear to be essential to accomplish this intended function. Examples are the groundwater underdrains storage tank and its foundation; flow path between the groundwater sump and the groundwater underdrains storage tank; the outflow components from the groundwater underdrains storage tank; sump pump; standpipe assembly; sump water level and pump operability monitoring instrumentation. Therefore, the applicant was requested to (1) provide a clear and concise description of the safety-related groundwater collection and removal intended function; (2) identify all the structural and mechanical components that are essential to accomplishing this intended function; (3) list the components identified in (2), above, that are within the scope of license renewal, and indicate where they are covered in LRA Sections 2.3 or 2.4; and (4) list the components identified in (2), above, that are not within the scope of license renewal, and provide the technical basis for this determination.

In its response to RAI 2.4-13, dated November 9, 2004, the applicant stated:

As stated in Millstone Unit 3 LRA Section 2.3.3.51, an intended function of the Reactor Plant Aerated Drains System is the collection and removal of groundwater from the ESF building underdrains and porous concrete. As further stated in Section 2.3.3.51, the evaluation boundary of the system includes the piping and components that provide for collection and removal of groundwater from the ESF Building underdrains and porous concrete. Specifically, the evaluation boundary, as identified on license renewal drawing 25212-LR26906, Sh. 4, includes the piping from the porous concrete subfoundation underdrains to the collection sump, the sump pump, the pump discharge piping, and the sump casing and expansion joint to a point outside the ESF Building. The applicable components are included in the component types "Expansion Joints," "Groundwater Sump," "Pipe," and "Pumps" in LRA Table 2.3.3-48. (Note: The groundwater sump, 3SRW*SUMP6, was inadvertently not highlighted on license renewal drawing 25212-LR26906, Sh. 4). The evaluation boundary shown on license renewal drawing 25212-LR26906, Sh. 4, stops where the sump discharge reaches the yard area outside the ESF Building since this is sufficient to accomplish the intended function to collect and remove drainage from the porous concrete subfoundation. The groundwater underdrains storage tank and associated foundation, and components in the flowpath outside the ESF Building, are not required to support the identified intended function.

However, in response to RAI 2.1-1, the groundwater underdrains storage tank and associated piping have been added to the scope of license renewal as a non-safety-related component that is spatially oriented such that its failure could prevent the function of safety-related SSCs. The groundwater underdrains storage tank shares the foundation of the Unit 3 refueling water storage tank which is within the scope of license renewal as indicated in LRA Table 2.4.2-32.

Sump level monitoring and pump operability instrumentation, although in scope, are active components and not subject to aging management review.

Based on its review, the staff finds the applicant's response to RAI 2.4-13 acceptable because the applicant has appropriately addressed all of the items identified in the RAI. The staff notes that the applicant added the groundwater underdrain storage tank and foundation and associated piping to the LR scope in response to RAI 2.1-1. The staff considers its concern described in RAI 2.4-13 resolved.

2.4B.1.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the containment that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the containment that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2 Structures and Component Supports

In LRA Section 2.4.2, the applicant identified the structures and components of the structures and component supports that are subject to an AMR for license renewal.

The applicant describes the structures and component supports in the following sections:

- 2.4.2.1 Unit 3 containment enclosure building
- 2.4.2.2 Unit 3 auxiliary building
- 2.4.2.3 Unit 3 control building
- 2.4.2.4 Unit 3 fuel building
- 2.4.2.5 railroad canopy
- 2.4.2.6 Unit 3 hydrogen recombiner building
- 2.4.2.7 Unit 3 engineered safety features building
- 2.4.2.8 Unit 3 main steam valve building
- 2.4.2.9 Unit 3 emergency generator enclosure and fuel oil tank vault
- 2.4.2.10 Unit 2 fire pump house
- 2.4.2.11 Unit 3 fire pump house
- 2.4.2.12 Unit 3 service building
- 2.4.2.13 Unit 3 turbine building
- 2.4.2.14 Unit 3 auxiliary boiler enclosure
- 2.4.2.15 Unit 3 technical support center
- 2.4.2.16 Unit 3 maintenance shop
- 2.4.2.17 Unit 3 waster disposal building
- 2.4.2.18 SBO diesel generator enclosure and fuel oil tank vault
- 2.4.2.19 Unit 3 condensate polishing enclosure
- 2.4.2.20 Unit 2 condensate polishing facility and Warehouse No. 5
- 2.4.2.21 security diesel generator enclosure
- 2.4.2.22 stack monitoring equipment building
- 2.4.2.23 Millstone stack
- 2.4.2.24 switchyard control house
- 2.4.2.25 switchyard, 345kV
- 2.4.2.26 Unit 3 circulating and service water pumphouse
- 2.4.2.27 Unit 3 west retaining wall
- 2.4.2.28 sea wall
- 2.4.2.29 Unit 3 circulating water discharge tunnel and discharge structure
- 2.4.2.30 Unit 3 recirculation tempering line
- 2.4.2.31 vacuum priming pumphouse
- 2.4.2.32 tank foundations
- 2.4.2.33 yard structures

The corresponding subsections of this SER (2.4B.2.1 - 2.4B.2.33, respectively) present the staff’s related review findings.

2.4B.2.1 Unit 3 Containment Enclosure Building

2.4B.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.1, the applicant described the Unit 3 containment enclosure building. The Unit 3 containment enclosure building is a cylindrical steel framed structure with metal siding, intermediate grating floors, and a metal roof deck. The containment enclosure building is designed and constructed to limit radioactive leakage to the environment in the unlikely event of a loss-of-coolant accident. It envelops the containment building completely above grade, as well as a portion of the engineering safety features building, auxiliary building, main steam valve building, and the hydrogen recombiner building. The containment enclosure building is supported entirely on the containment structure with sliding joints and has no foundation.

The containment enclosure building is a Seismic Category I structure. The containment enclosure building non-safety-related structural members support the function of safety-related equipment. The containment enclosure building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-1, the applicant identified the following Unit 3 containment enclosure building component types that are within the scope of license renewal and subject to an AMR: doors; gaskets; hatches; metal siding; metal siding-caulking; miscellaneous steel (brackets, ladders, platforms and grating, stairs); scuppers; sliding joints; structural reinforced concrete (grade beams, slabs on grade); structural steel (beams, bracing, columns and baseplates, and roof framing and decking).

2.4B.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.1 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 containment enclosure building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.1.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 containment enclosure building that are within the scope of license renewal, as required by

10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 containment enclosure building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.2 Unit 3 Auxiliary Building

2.4B.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.2, the applicant described the Unit 3 auxiliary building. The auxiliary building (including the electrical cable tunnel) is a multi-story structure located west of the Fuel building, east of the service building, and north of the containment. An electrical cable tunnel extends from the auxiliary building, through the basement level of the service building to the control building. The auxiliary building structure is comprised of a reinforced concrete mat founded on bedrock. The southern end of the auxiliary building is open on the side adjacent to the containment electrical penetrations. The auxiliary building exterior walls provide vertical support for beams on the east-side of the service building.

The Unit 3 auxiliary building is a Seismic Category I structure. The Unit 3 auxiliary building non-safety-related structural members support the function of safety-related equipment. The Unit 3 auxiliary building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a missile (internal or external) barrier
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-2, the applicant identified the following Unit 3 auxiliary building component types that are within the scope of license renewal and subject to an AMR: doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; masonry block walls; miscellaneous steel [checkered plates, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; missile barriers; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls); structural steel (columns and baseplates, concrete floor framing and decking, roof framing and decking); sump liner; and tunnel.

2.4B.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.2 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 auxiliary building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.2 identified one area in which additional information was necessary to complete the review of the applicant's scoping and screening results. Therefore, the staff issued RAI 2.4-14, to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1). The staff's RAI is described below.

FSAR Sections 2.5.4.12 and 3.8.4.1 stated that rock dowels were installed around the periphery of the auxiliary building to provide stability during seismic loading. FSAR Section 2.5.4.12 also stated that rock anchors were installed (1) in the turbine building to provide resistance to overturning due to tornado loading, and (2) in the service building to provide resistance to uplift due to buoyant forces and seismic forces. LRA Section 2.4.2.2, Unit 3 auxiliary building; LRA Section 2.4.2.12, Unit 3 service building; and LRA Section 2.4.2.13, Unit 3 turbine building did not discuss the use of rock dowels and/or rock anchors for these structures, and rock dowels/rock anchors were not specifically identified as component types requiring an aging management review in LRA Tables 2.4.2-2, 2.4.2-12, and 2.4.2-13. In RAI 2.4-14, the staff requested the applicant to clarify whether these rock dowels/anchors are within the scope of license renewal. If they were, the applicant was requested to identify where they were included in LRA Tables 2.4.2-2, 2.4.2-12, and 2.4.2-13. If not within the scope of license renewal, the applicant was requested to provide the technical basis for this determination.

In its response to RAI 2.4-14, dated November 9, 2004, the applicant stated that rock dowels were installed around the periphery of the auxiliary building foundation and rock anchors were installed in the service building and turbine building foundation. These rock dowels and rock anchors were considered part of the concrete foundation and were included in the structural member "Structural Reinforced Concrete" in LRA Tables 2.4.2-2, 2.4.2-12, and 2.4.2-13 and subject to aging management.

Based on its review, the staff finds the applicant's response to RAI 2.4-14 acceptable, because the applicant has clarified that the rock dowels and rock anchors are included in the LR scope, under the component type, "Structural Reinforced Concrete," in LRA Tables 2.4.2-2, 2.4.2-12, and 2.4.2-13. The staff considers its concern described in RAI 2.4-14 resolved.

2.4B.2.2.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 auxiliary building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 auxiliary building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.3 Unit 3 Control Building

2.4B.2.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.3, the applicant described the Unit 3 control building. The Unit 3 control building houses the control room, which maintains an independent pressure boundary envelope for habitability during a design basis accident. The Unit 3 control building is located north of the Unit 3 turbine building, south of the emergency generator enclosure, east of the Unit 3 technical support center, and west of the Unit 3 service building. The Unit 3 control building is comprised of a reinforced concrete mat founded on structural backfill, overlying till, and bedrock. The Unit 3 control building's exterior walls provide vertical support for beams on the west side of the Unit 3 service building.

The Unit 3 control building is a Seismic Category I structure. The Unit 3 control building non-safety-related structural members support the function of safety-related equipment. The Unit 3 control building also supports fire protection, station blackout, and anticipated transient without scram.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a protective barrier for internal/external flooding events
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a missile (internal or external) barrier
- provides EQ barrier and/or HELB barrier
- provides jet impingement shielding for HELBs

In LRA Table 2.4.2-3, the applicant identified the following Unit 3 control building component types that are within the scope of license renewal and subject to an AMR: access covers; control room ceiling supports; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; masonry block walls; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.), ladders, platforms and grating, stairs];

missile barriers; scuppers; service water pipe enclosure; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls); structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, and roof framing and decking).

2.4B.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.3 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 control building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.3.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 control building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 control building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.4 Unit 3 Fuel Building

2.4B.2.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.4, the applicant described the Unit 3 fuel building. The Unit 3 fuel building includes the fuel building structure (including pipe tunnel), spent fuel pool (including transfer canal and shipping cask storage area), spent fuel storage racks, cask washdown area, and new fuel storage racks.

The Unit 3 fuel building is a Seismic Category I structure. The fuel building non-safety-related structural members support the function of safety-related equipment. The fuel building also contains EQ equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

- provides a protective barrier for internal/external flooding events
- provides a pressure boundary
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a missile (internal or external) barrier

In LRA Table 2.4.2-4, the applicant identified the following Unit 3 fuel building component types that are within the scope of license renewal and subject to an AMR: cask wash pit liner; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; neutron absorber elements; new fuel storage racks; spent fuel pool gate; spent fuel pool liner plates; spent fuel storage racks; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls); structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking); sump liner; and tunnel.

2.4B.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.4 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 fuel building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.4.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 fuel building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 fuel building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.5 Railroad Canopy

2.4B.2.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.5, the applicant described the railroad canopy. The railroad canopy is located to the east of the fuel building and protects the spent fuel pool from tornado-generated missiles. The canopy structure is comprised of a reinforced concrete mat foundation founded on concrete fill. It has reinforced concrete walls and a roof slab with a metal deck supported by structural steel.

The railroad canopy is is a Seismic Category I structure that provides missile protection for the spent fuel pool.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)

In LRA Table 2.4.2-5, the applicant identified the following railroad canopy component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (foundation mat slabs, roof slabs, walls); and structural steel (roof framing and decking).

2.4B.2.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.5 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the railroad canopy described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.5.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the railroad canopy that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the railroad canopy that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.6 Unit 3 Hydrogen Recombiner Building

2.4B.2.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.6, the applicant described the Unit 3 hydrogen recombiner building. The Unit 3 hydrogen recombiner building is located adjacent to the containment, on the southeast side, directly below the equipment hatch. The structure is constructed of reinforced concrete floor slabs, a roof slab, and walls supported on a reinforced concrete mat, founded on concrete fill. Concrete roof hatches allow for access to equipment. Roof scuppers are installed to control flooding in the event of heavy rainfall.

The Unit 3 hydrogen recombiner buildingis a Seismic Category I structure. The hydrogen recombiner building non-safety-related structural members support the function of safety-related equipment. The hydrogen recombiner building also supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-6, the applicant identified the following Unit 3 hydrogen recombiner building component types that are within the scope of license renewal and subject to an AMR: doors; equipment pads/grout; hatches; miscellaneous steel [brackets, embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; missile barriers; scuppers; and structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs).

2.4B.2.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.6 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 hydrogen recombiner building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.6.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 hydrogen recombiner building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 hydrogen recombiner building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.7 Unit 3 Engineered Safety Features Building

2.4B.2.7.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.7, the applicant described the Unit 3 engineered safety features building. The Unit 3 ESF building is a safety-related structure that wraps around the east side of the containment. Most of the Unit 3 ESF building is founded on bedrock and a portion (containment recirculation pump pit area) of the structure is founded on a porous concrete sub-foundation, that is placed on the bedrock.

The Unit 3 ESF building is a Seismic Category I structure. The Unit 3 ESF building non-safety-related structural members support the function of safety-related equipment. The Unit 3 ESF building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a missile (internal or external) barrier
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-7, the applicant identified the following Unit 3 ESF building component types that are within the scope of license renewal and subject to an AMR: doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating]; structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs, walls); structural steel (beams, columns and baseplates, concrete floor framing and decking, roof framing and decking); sub-foundation; and sump liner.

2.4B.2.7.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.7 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 ESF building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.7.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 engineered safety features building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 engineered safety features building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.8 Unit 3 Main Steam Valve Building

2.4B.2.8.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.8, the applicant described the Unit 3 main steam valve building. The Unit 3 main steam valve building, located west of and directly adjacent to the containment, protects the main steam and feedwater valves and piping from tornado-generated missiles.

The Unit 3 main steam valve building is a Seismic Category I structure, which provides protection for main steam and feedwater valves and piping from missiles. The Unit 3 main steam valve building non-safety-related structural members support the function of safety-related equipment. The Unit 3 main steam valve building also contains EQ equipment, and supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events

- provides a missile (internal or external) barrier
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides jet impingement shielding for high energy line breaks
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-8, the applicant identified the following Unit 3 main steam valve building component types that are within the scope of license renewal and subject to an AMR: blow-off metal siding/ panel; doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating, stairs]; missile barriers; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls); and structural steel (beams, bracing, concrete floor framing and decking, roof framing and decking).

2.4B.2.8.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.8 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 main steam valve building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.8.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 main steam valve building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 main steam valve building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.9 Unit 3 Emergency Generator Enclosure and Fuel Oil Tank Vault

2.4B.2.9.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.9, the applicant described the Unit 3 emergency generator enclosure and fuel oil tank vault. The Unit 3 emergency generator enclosure and fuel oil tank vault is a multi-story, reinforced concrete structure with concrete floor slabs, roof slabs, and walls. It is supported on a reinforced concrete spread footing placed on glacial till.

The Unit 3 emergency generator enclosure and fuel oil tank vault is a Seismic Category I structure that provides support and protection for the emergency diesel generator units and associated fuel oil tanks. The Unit 3 emergency generator enclosure and fuel oil tank vault non-safety-related structural members support the function of safety-related equipment. The Unit 3 emergency generator enclosure and fuel oil tank vault also supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events
- provides a missile (internal or external) barrier
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides EQ barrier and/or HELB barrier

In LRA Table 2.4.2-9, the applicant identified the following Unit 3 emergency generator enclosure and fuel oil tank vault component types that are within the scope of license renewal and subject to an AMR: doors; equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; fuel oil tank vault; hatches; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating]; structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade, walls); and trench.

2.4B.2.9.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.9 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 emergency generator enclosure and fuel oil tank vault described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.9.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine

whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 emergency generator enclosure and fuel oil tank vault that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 emergency generator enclosure and fuel oil tank vault that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.10 Unit 2 Fire Pump House

2.4B.2.10.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.10, the applicant described the Unit 2 fire pump house. The Unit 2 fire pump house is supported on a reinforced concrete mat foundation with reinforced masonry walls and structural steel beams supporting the roof. The roof is made up of a 4-inch-thick concrete slab over metal decking.

The Unit 2 fire pump house supports fire protection.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-10, the applicant identified the following Unit 2 fire pump house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete (foundation mat slabs, roof slabs); and structural steel (roof framing and decking).

2.4B.2.10.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.10 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 fire pump house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.10.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 fire pump house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 fire pump house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.11 Unit 3 Fire Pump House

2.4B.2.11.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.11, the applicant described the Unit 3 fire pump house. The Unit 3 fire pump house consists of a reinforced concrete mat foundation with reinforced masonry walls and structural steel beams supporting the roof. The roof is made up of a 4-inch-thick concrete slab over metal decking.

The Unit 3 fire pump house supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-11, the applicant identified the following Unit 3 fire pump house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; masonry block walls; structural reinforced concrete (foundation mat slabs, roof slabs); and structural steel (roof framing and decking).

2.4B.2.11.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.11 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 fire pump house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.11.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 fire pump house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 fire pump house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.12 Unit 3 Service Building

2.4B.2.12.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.12, the applicant described the Unit 3 service building. The Unit 3 service building is located between the control building and the auxiliary building. It has a concrete mat foundation and spread footings and is founded on bedrock. The superstructure is a steel-framed building with a metal roof deck.

The Unit 3 service building supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-12, the applicant identified the following Unit 3 service building component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; sliding joints; structural reinforced concrete (beams, columns, floor slabs, footing, foundation mat slabs, walls); structural steel (beams, columns and baseplates, concrete floor framing and decking, and roof framing and decking).

2.4B.2.12.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.12 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 service building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.12.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 service building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 service building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.13 Unit 3 Turbine Building

2.4B.2.13.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.13, the applicant described the Unit 3 turbine building. The Unit 3 turbine building is located west of the Unit 3 containment. The Unit 3 turbine building is a non-safety-related structure supported on spread footings and founded on basal till and compacted select granular fill. The foundation walls are reinforced concrete to grade with a steel-framed superstructure. There is an auxiliary bay of the same construction on the east side of the Unit 3 turbine building. The Unit 3 turbine building has a basement level 10 feet below-grade. The Unit 3 turbine building contains the turbine pedestal, which supports the operating floor framing. A 4-inch concrete dike is provided around the perimeter of the seal oil tank for oil containment.

The Unit 3 turbine building contains EQ equipment and supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-13, the applicant identified the following Unit 3 turbine building component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (beams, columns, floor slabs, footing and grade beams, walls); structural steel (beams, columns and baseplates, concrete floor framing and decking); and turbine pedestal.

2.4B.2.13.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.13 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 turbine building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.13 identified one area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The staff issued RAI 2.4-14, to determine whether the applicant properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1). The staff's RAI, the applicant's response, and the staff's evaluation are discussed in Section 2.4.2.2.2 of this SER. For the reasons set forth in that subsection, the staff considers its concern described in RAI 2.4-14 to be resolved.

2.4B.2.13.3 Conclusion

The staff reviewed the LRA and related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 turbine building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 turbine building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.14 Unit 3 Auxiliary Boiler Enclosure

2.4B.2.14.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.14, the applicant described the Unit 3 auxiliary boiler enclosure. The Unit 3 auxiliary boiler enclosure is located south of the Unit 3 turbine building and houses the two auxiliary boilers and related equipment. The structure has a concrete floor supported on spread footings. It is a conventional steel-framed structure.

The Unit 3 auxiliary boiler enclosure supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-14, the applicant identified the following Unit 3 auxiliary boiler enclosure component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; structural reinforced concrete (floor slabs, foundation mat slabs, walls); and structural steel (beams, columns and baseplates, concrete floor framing and decking, roof framing and decking).

2.4B.2.14.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.14 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 auxiliary boiler enclosure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.14.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 auxiliary boiler enclosure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 auxiliary boiler enclosure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.15 Unit 3 Technical Support Center

2.4B.2.15.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.15, the applicant described the Unit 3 technical support center. The Unit 3 technical support center is located adjacent to the Unit 3 control building. It is a one-level reinforced concrete structure that is supported on a concrete mat foundation, placed on structural fill.

The Unit 3 technical support center supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-15, the applicant identified the following Unit 3 technical support center component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout and structural reinforced concrete (beams, columns, floor slabs, footing, roof slabs, walls).

2.4B.2.15.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.15 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 technical support center described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.15.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 technical support center that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 technical support center that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.16 Unit 3 Maintenance Shop

2.4B.2.16.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.16, the applicant described the Unit 3 maintenance shop. The Unit 3 maintenance shop is located adjacent to the north wall of the Unit 3 service building. The walls of the maintenance shop are constructed of a combination of solid masonry-block walls and steel framing. The roof consists of a concrete slab on metal decking that is supported by a structural steel frame. The maintenance shop is supported on reinforced concrete spread footings and has a reinforced concrete floor slab.

The Unit 3 maintenance shop supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-16, the applicant identified the following Unit 3 maintenance shop component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete (beams, floor slab, spread footings, walls); and structural steel (beams, bracing, columns and baseplates, concrete floor framing and decking, roof framing and decking).

2.4B.2.16.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.16 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 maintenance shop described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.16.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 maintenance shop that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 maintenance shop that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.17 Unit 3 Waste Disposal Building

2.4B.2.17.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.17, the applicant described the Unit 3 waste disposal building. The Unit 3 waste disposal building is located north of the Unit 3 fuel building and east of the auxiliary building. The Unit 3 waste disposal building consists of a superstructure with reinforced concrete walls, and a steel-framed enclosure that is supported on a concrete mat foundation founded on bedrock and basal till. The roof is constructed of metal decking.

The Unit 3 waste disposal building supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-17, the applicant identified the following Unit 3 waste disposal building component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete (beams, floor slabs, footing, slabs on grade, walls); and structural steel (beams, columns and baseplates, roof framing and decking).

2.4B.2.17.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.17 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 waste disposal building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.17.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 waste disposal building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 waste disposal building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.18 SBO Diesel Generator Enclosure and Fuel Oil Tank Vault

2.4B.2.18.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.18, the applicant described the SBO diesel generator enclosure and fuel oil tank vault. The SBO diesel generator enclosure includes the SBO diesel generator switchgear enclosure, the concrete pad that supports the SBO diesel generator exhaust, and the separate building that provides support and shelter for the SBO diesel.

The SBO diesel generator enclosure and fuel oil tank vault supports fire protection and station blackout.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-18, the applicant identified the following SBO diesel generator enclosure and fuel oil tank vault component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (checkered plates); roofing; siding; structural reinforced concrete (foundation mat slabs); and structural steel (beams, bracing).

2.4B.2.18.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.18 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the SBO diesel generator enclosure and fuel oil tank vault described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.18.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the SBO diesel generator enclosure and fuel oil tank vault that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SBO diesel generator enclosure and fuel oil tank vault that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.19 Unit 3 Condensate Polishing Enclosure

2.4B.2.19.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.19, the applicant described the Unit 3 condensate polishing enclosure. The Unit 3 condensate polishing enclosure is located south of the Unit 3 turbine building. The enclosure is a two-story, reinforced concrete structure supported on a spread footing placed on structural fill.

The Unit 3 condensate polishing enclosure supports fire protection.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-19, the applicant identified the following Unit 3 condensate polishing enclosure component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; structural reinforced concrete (beams, columns, floor slabs, spread footing, walls); and structural steel (beams, columns and baseplates, concrete floor framing and decking, roof framing and decking).

2.4B.2.19.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.19 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 condensate polishing enclosure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.19.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 condensate polishing enclosure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 condensate polishing enclosure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.20 Unit 2 Condensate Polishing Facility and Warehouse No. 5

2.4B.2.20.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.20, the applicant described the Unit 2 condensate polishing facility and Warehouse No. 5. The Unit 2 condensate polishing facility is a non-safety-related, non-seismic structure located in Warehouse No. 5, which also houses Unit 3 fire protection piping. Unit 2 shares this warehouse with Unit 3. The structure is located north of the Unit 2 turbine building and has a reinforced concrete mat foundation founded on structural fill. The Unit 2 condensate polishing facility is located approximately 20 feet below grade. There are three main levels and a penthouse that is located in the middle of the structure near the west wall. The superstructure is a steel-framed structure and some areas of the structure have masonry walls.

The Unit 2 condensate polishing facility and Warehouse No. 5 supports station blackout and fire protection.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-20, the applicant identified the following Unit 2 condensate polishing facility and Warehouse No. 5 component types that are within the scope of license renewal and subject to an AMR: masonry block walls; miscellaneous steel (platforms and grating); and structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls); structural steel (beams, bracing, columns and baseplates).

2.4B.2.20.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.20 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 2 condensate polishing facility and Warehouse No. 5 described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.20.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 2 condensate polishing facility and Warehouse No. 5 that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 2 condensate polishing facility and Warehouse No. 5 that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.21 Security Diesel Generator Enclosure

2.4B.2.21.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.21, the applicant described the security diesel generator enclosure. The security diesel generator enclosure is a non-safety-related, non-seismic, one-story, free-standing structure that houses the security diesel generator and its support equipment, including the security diesel fuel oil tank. Power from the security diesel generators is used for general exterior illumination that is credited for fire protection events. The structure is constructed with aluminum sheeting riveted to a combination of aluminum and steel frame. The walls and roof are insulated and lined with plywood on the inside. The building is above grade, is supported by steel channels, and sits on a concrete slab foundation. Power cables and conduit from the generator are supported from the ceiling and internal wall surfaces of the structure.

The security diesel generator enclosure supports fire protection.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-21, the applicant identified the following security diesel generator enclosure component types that are within the scope of license renewal and subject to an AMR: miscellaneous steel (checkered plates); roofing; siding; structural framing; structural reinforced concrete (foundation mat slabs); and structural steel (beams, bracing).

2.4B.2.21.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.21 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the security diesel generator enclosure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.21.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the security diesel generator enclosure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the security diesel generator enclosure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.22 Stack Monitoring Equipment Building

2.4B.2.22.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.22, the applicant described the stack monitoring equipment building. The stack monitoring equipment building is a non-safety-related, non-seismic, single-story structure that provides support and shelter to non-safety-related equipment that can affect safety-related equipment. The building has a concrete roof and floor slab on grade with non-reinforced grouted masonry walls that are supported on a concrete spread footing.

The stack monitoring equipment building non-safety-related structural members support the function of safety-related equipment.

Intended functions within the scope of license renewal include providng structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-22, the applicant identified the following stack monitoring equipment building component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; and structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls).

2.4B.2.22.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.22 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the stack monitoring equipment building described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.22.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the stack monitoring equipment building that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the stack monitoring equipment building that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.23 Millstone Stack

2.4B.2.23.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.23, the applicant described the stack. The stack is a safety-related reinforced-concrete structure supported on a reinforced concrete mat foundation. The stack extends 375 feet above grade and has a circular orifice with a 7-foot inside diameter.

The stack is a Seismic Category I structure.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)

In LRA Table 2.4.2-23, the applicant identified the following stack component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (floor slabs, foundation mat slabs, walls); and structural steel (beams, bracing).

2.4B.2.23.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.23 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the stack described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.23.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the stack that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the stack that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.24 Switchyard Control House

2.4B.2.24.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.24, the applicant described the switchyard control house. The switchyard control house is a non-safety-related, non-seismic, one-story building that provides support and shelter for equipment utilized for closure of the 345kV circuit breakers that are credited for restoration of offsite power in the event of a station blackout.

The switchyard control house supports station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)

In LRA Table 2.4.2-24, the applicant identified the following switchyard control house component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; masonry block walls; structural reinforced concrete; and structural steel.

2.4B.2.24.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.24 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the switchyard control house described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.24.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the switchyard control house that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the switchyard control house that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.25 Switchyard, 345kV

2.4B.2.25.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.25, the applicant described the 345kV switchyard. Structural members associated with the in-scope electrical equipment required for the restoration of offsite power include transmission towers and dead end structures and associated foundations, breaker and disconnect foundations and support structures, and the non-safety-related, non-seismic, reserve station service transformers foundations.

The 345kV switchyard structural members support station blackout.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-25, the applicant identified the following 345kV switchyard component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete and structural steel.

2.4B.2.25.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.25 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the 345kV switchyard described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.25.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the 345kV switchyard that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the 345kV switchyard that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.26 Unit 3 Circulating and Service Water Pumphouse

2.4B.2.26.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.26, the applicant described the Unit 3 circulating and SW pumphouse. The Unit 3 circulating and service water pumphouse serve as the intake structure. The circulating and service water pumphouse is a Seismic Category I (service water cubicles only) reinforced concrete structure located west of the main plant. The structure consists of six individual bays that provide sea water from the Niantic Bay to six non-safety-related circulating water pumps. Four of the six bays also supply water to four safety-related service water pumps for the purpose of emergency and normal heat removal from heat exchangers and equipment. The SW system is the only safety-related system located in the Unit 3 circulating and SW pumphouse.

The Unit 3 circulating and service water pumphouse is a Seismic Category I (service water cubicles only) structure that provides a source of cooling water to the safety-related SW pumps. The Unit 3 circulating and service water pumphouse non-safety-related structural members support the function of safety-related equipment. The Unit 3 circulating and service water pumphouse also supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a source of cooling water for plant shutdown
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-26, the applicant identified the following Unit 3 circulating and service water pumphouse component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; flood/spill barriers including curbs, dikes, toe plates, and stop logs; hatches; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) ladders, platforms and grating]; missile barriers; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls); and trash racks.

2.4B.2.26.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.26 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 circulating and service water pumphouse described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.4.26 identified one area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. Therefore, the staff issued RAI 2.4-9 to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The staff’s RAI is described below.

LRA Section 2.4.2.26 for Millstone 3 discussed the scoping and screening results for the Unit 3 circulating and SW pumphouse and referenced FSAR Section 3.8.4 for further details. FSAR Figure 3.8-69 (sheet 4 of 4) indicated that sluice gates were located in the concrete chamber located in the front of the pumphouse. It appeared that these sluice gates were associated with the operation of the Unit 3 recirculation tempering line discussed in LRA Section 2.4.2.30. The applicant was requested to clarify whether these sluice gates were within the scope of license renewal. If they were, the applicant was requested to identify where they were included in LRA Table 2.4.2-26. If they were not, the applicant was requested explain why not.

In its response to RAI 2.4-9, dated November 9, 2004, the applicant stated:

> The sluice gates consist of a frame, guides, and sliding gate installed in the concrete chamber walls. These component parts are the equivalent of valve internals and have been determined to be active components. However, the sluice gate is not configured with a pressure boundary housing. Therefore, although the sluice gates are within the scope of license renewal, they are active components that do not require aging management review, and are not included in LRA Table 2.4.2-26.

Based on its review, the staff finds the applicant’s response to RAI 2.4-9 acceptable. The staff concurs with the applicant’s assessment that the sluice gates are in the LR scope, but may be treated as active components, similar to valves. Unlike valves, the sluice gates do not perform a passive pressure boundary intended function, and consequently do not require aging management. The staff considers its concern described in RAI 2.4-9 resolved.

2.4B.2.26.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 circulating and service water pumphouse that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 circulating and service water pumphouse that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.27 Unit 3 West Retaining Wall

2.4B.2.27.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.27, the applicant described the Unit 3 west retaining wall. A safety-related reinforced concrete retaining wall is provided on the west side of the circulating and service water pumphouse to protect the safety-related SW lines and the concrete duct bank containing the power and control cables from being undermined due to wave action on the adjoining slope. The Unit 3 west retaining wall, which is approximately 126 feet in length, is an extension of the west wall on the circulating and SW pumphouse and extends in a northerly direction along an adjoining earthen slope. The top of the Unit 3 west retaining wall is at approximately 14 feet mean sea level. The retaining wall footing is founded on bedrock.

The Unit 3 west retaining wall is a Seismic Category I structure that provides protection for safety-related service water piping.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-27, the applicant identified the following Unit 3 west retaining wall component type that is within the scope of license renewal and subject to an AMR: structural reinforced concrete (footing, walls).

2.4B.2.27.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.27 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 west retaining wall described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.27 identified one area in which additional information was necessary to complete the review of the applicant's scoping and screening results. Therefore, the staff issued RAI 2.4-10, to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1). The staff's RAI is described below.

LRA Section 2.4.2.27 for Millstone 3 discusses the scoping and screening results for the Unit 3 west retaining wall. The LRA states that the Unit 3 retaining wall is within the scope of license renewal because it meets 10 CFR 54.4(a)(1) because it is a Seismic Category I structure that provides protection for safety-related SW piping. FSAR Section 3.8.4.1 states that the function of the west retaining wall is to protect the Category 1 SW and electrical lines located behind the wall and to be part of the shoreline protection. FSAR Section 2.5.5.1.1 further states that the west retaining wall is to protect the circulating and SW lines from being undermined due to wave action on the adjoining slope. This slope is referred to in FSAR Section 2.5.5.1.1 as the "shoreline slope," and the FSAR states that a multilayer stone armor zone was placed on the slope for protection against wave action during the probable maximum hurricane. There is considerable discussion in FSAR Section 2.5.5 concerning the analysis of the stability of this slope under static, dynamic and post-earthquake conditions. The applicant was requested to explain whether the shoreline slope serves an intended function in accordance with 10 CFR 54.4(a)(2). If so, applicant was requested to identify the components of the slope that are subject to an AMR and the results of that review.

In its response to RAI 2.4-10, dated November 9, 2004, the applicant stated:

> The shoreline slope configuration and multilayer stone armor zone described in FSAR Section 2.5.5.1.1 is not required to protect the nearby West Retaining Wall and Circulating and Service Water Pumphouse Category I structures or the service water lines and electrical cabling. However, failure of the shoreline slope stone armor, which was placed to protect the slope from wave action based on the probable maximum hurricane, could result in erosion or a slope failure of the shoreline slope and displacement of material to near the intake bays, possibly resulting in a restriction of the service water pump suction. Therefore, the multilayer stone armor zone should have been included within the scope of license renewal and subject to aging management review.

Based on its review, the staff finds the applicant's response to RAI 2.4-10 acceptable from the scoping and screening perspective. The applicant has identified that the "multilayer stone armor zone" is included in the LR scope, because failure of the shoreline slope might restrict SW pump suction. The staff considers its concern described in RAI 2.4-10 resolved.

2.4B.2.27.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 west retaining wall that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.28 Sea Wall

2.4B.2.28.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.28, the applicant described the sea wall. The Unit 3 circulating and SW pumphouse is protected from wave action by a reinforced concrete sea wall with post-tensioned rock anchors consisting of steel tendons. The wall is supported by a reinforced concrete footing, which is founded upon concrete fill and rock. The top of the wall is approximately 14 ft. above mean sea level.

The concrete sea wall is a non-safety-related structure that protects the structural integrity of the safety-related Unit 3 circulating and SW pumphouse.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a protective barrier for internal/external flooding events

In LRA Table 2.4.2-28, the applicant identified the following sea wall component type that is within the scope of license renewal and subject to an AMR: structural reinforced concrete (footing, walls).

2.4B.2.28.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.28 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the sea wall described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

The staff’s review of LRA Section 2.4.28 identified one area in which additional information was necessary to complete the review of the applicant’s scoping and screening results. Therefore, the staff issued RAI 2.4-11, to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4(a), and the screening criteria of 10 CFR 54.21(a)(1). The staff’s RAI is described below.

LRA Section 2.4.2.28 for Millstone 3 discussed the scoping and screening results for the sea walls. The LRA stated that the walls are reinforced concrete with post-tensioned rock anchors consisting of steel tendons. FSAR Section 2.5.5.1.1 provided similar information. A typical anchorage was not shown in the Millstone 3 FSAR; however, from the written description, it appeared that the details are similar to those shown in Figure 2.5-15 of the Millstone 2 FSAR. LRA Table 2.4.2-28 listed the sea wall structural members requiring aging management review as “structural reinforced concrete (footing, walls).” The applicant was requested to clarify whether the Millstone 3 sea wall anchorage system was the same as that shown in the Millstone 2 FSAR Figure 2.5-15 and to indicate whether the anchorage system was within the scope of license renewal and included as part of the item listed in LRA Table 2.4.2-28. If the anchorage system was not included within the scope of license renewal, the applicant was requested to explain why not.

In its response to RAI 2.4-11, dated November 9, 2004, the applicant stated that the Unit 3 sea wall anchorage design is the same as the Unit 2 design except that the unbonded length of the anchor strands is protected with a corrosion protection material instead of grout.

The sea wall anchorage functions to maintain integrity of the sea wall and is within the scope of license renewal. The sea wall anchorage was omitted from LRA Table 2.4.2-28 and Table 3.5.2-29.

Based on its review, the staff finds the applicant’s response to RAI 2.4-11 acceptable based on the inclusion of the component. The staff considers its concern described in RAI 2.4-11 resolved.

2.4B.2.28.3 Conclusion

The staff reviewed the LRA, related structural/component information, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the sea wall that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the sea wall that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.29 Unit 3 Circulating Water Discharge Tunnel and Discharge Structure

2.4B.2.29.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.29, the applicant described the Unit 3 circulating water discharge tunnel and discharge structure. The SW and circulating water systems discharge into the discharge tunnel. The circulating water discharge tunnel is a reinforced concrete structure that is located below grade. It extends from the turbine building to the rock quarry. The reinforced concrete tunnel is founded on rock, concrete fill, and till.

The circulating water discharge structure, a continuation of the circulating water discharge tunnel, is located at the end of the circulating water discharge tunnel. It is a reinforced-concrete structure with a portion of the structure below grade and a portion exposed to atmosphere and weather. The circulating water discharge structure has a seal pit with a concrete weir wall where the discharge water is forced up and over the wall and into the rock quarry. From the quarry, the water passes through a channel into Long Island Sound.

The Unit 3 circulating water discharge tunnel and discharge structure are Seismic Category I structures whose failure could affect the discharge path of the safety-related SW system.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a pressure boundary

In LRA Table 2.4.2-29, the applicant identified the following Unit 3 circulating water discharge tunnel and discharge structure component type that is within the scope of license renewal and subject to an AMR: structural reinforced concrete (floor slabs, roof slabs, walls).

2.4B.2.29.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.29 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 circulating water discharge tunnel and discharge structure described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.29.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 circulating water discharge tunnel and discharge structure that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 circulating water discharge tunnel and discharge structure that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.30 Unit 3 Recirculation Tempering Line

2.4B.2.30.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.30, the applicant described the Unit 3 recirculation tempering line. A non-safety-related recirculation tempering line is provided from the circulating water discharge tunnel to the Unit 3 circulating and SW pumphouse to provide for de-icing at the intake, if required.

The Unit 3 recirculation tempering line is a non-safety-related structure whose failure could allow the formation of ice to occur in front of the Unit 3 circulating and SW pumphouse, thus blocking flow to the safety-related SW system.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-30, the applicant identified the following Unit 3 recirculation tempering line component types that are within the scope of license renewal and subject to an AMR: equipment pads/grout; miscellaneous steel [embedded steel-exposed surfaces (shapes, plates, unistrut, etc.) platforms and grating]; and structural reinforced concrete (beams, foundation mat slabs, roof slabs, walls).

2.4B.2.30.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.30 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the Unit 3 recirculation tempering line described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.30.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the Unit 3 recirculation tempering line that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the Unit 3 recirculation tempering line that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.31 Vacuum Priming Pumphouse

2.4B.2.31.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.31, the applicant described the vacuum priming pumphouse. The vacuum priming pumphouse contains the vacuum priming system for the Unit 3 circulating water discharge tunnel and includes fire suppression equipment. The vacuum priming pumphouse, which is located on top of the Unit 3 circulating water discharge structure, is a one-level reinforced-concrete structure with a concrete mat foundation. The structural walls and roof slab are constructed of concrete.

The vacuum priming pumphouse supports fire protection.

Intended functions within the scope of license renewal include providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3).

In LRA Table 2.4.2-31, the applicant identified the following vacuum priming pumphouse component type that is within the scope of license renewal and subject to an AMR: pipe.

2.4B.2.31.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.31 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the vacuum priming pumphouse described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived component was subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.31.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the component of the vacuum priming pumphouse that is within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the component of the vacuum priming pumphouse that is subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.32 Tank Foundations

2.4B.2.32.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.32, the applicant described the tank foundations. The applicant described the following foundations that are within the scope of license renewal:

- Unit 3 condensate storage tank foundation
- fire water tank 1 and 2 foundations
- Unit 3 refueling water storage tank foundation
- SBO diesel fuel oil storage tank foundation
- Unit 3 demineralized water storage tank foundation and enclosure
- Unit 3 carbon dioxide tank foundation
- Unit 3 boron recovery tanks foundation and enclosure

The fire water tank 1 and 2 foundations, the carbon dioxide tank foundation, and the boron recovery tank foundation and enclosure supports fire protection. The refueling water storage tank foundation and the demineralized water storage tank foundation and enclosure qualify as Seismic Category 1 structures and enclosures. The condensate storage tank foundation provides support for the in-scope, non-safety-related condensate storage tank. The SBO diesel fuel oil storage tank foundation supports fire protection and station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

In LRA Table 2.4.2-32, the applicant identified the following tank foundations component type that is within the scope of license renewal and subject to an AMR: structural reinforced concrete (foundation mat slabs, roof slabs, footing, walls).

2.4B.2.32.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.32 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the tank foundations described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.32.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the tank foundations that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the tank foundations that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.2.33 Yard Structures

2.4B.2.33.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.33, the applicant described the yard structures. The applicant described the following yard structures that are within the scope of license renewal:

- Unit 3 transformer firewalls and dikes
- SBO diesel fuel oil storage tank dike
- SBO fuel oil tank tent
- Unit 3 yard valve pits and enclosure
- Unit 3 pipe tunnel
- Unit 3 encasement
- Unit 3 manholes
- Unit 3 duct banks
- Unit 3 security lighting supports (including poles)
- technical support building

The transformer firewalls and dikes, the SBO diesel fuel oil storage tank dike, the SBO fuel oil tank vent, the pipe tunnel, the security lighting supports, and the technical support building support fire protection. The valve yard pits and enclosure non-safety-related structural members support the function of safety-related equipment; the valve yard pits and enclosure also meet by supporting fire protection. The encasement is a non-safety-related structure that provides protection for safety-related service water system piping. The manholes contain electrical cables for safety-related in scope equipment; the manholes also supports station blackout. The duct banks support and protect electrical cables for safety-related, in-scope equipment; other duct banks support station blackout.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides a missile (internal or external) barrier

In LRA Table 2.4.2-33, the applicant identified the following yard structures component types that are within the scope of license renewal and subject to an AMR: structural reinforced concrete (footing, walls); flood/spill barriers including curbs, dikes, toe plates, and stop logs; miscellaneous steel (checkered plates); structural steel (beams, bracing); access covers; manhole covers; metal siding; structural reinforced concrete (foundation mat slabs, roof slabs, walls); manhole covers; structural steel; encasement; duct banks; and lighting poles.

2.4B.2.33.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.33 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the yard structures described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.2.33.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the yard structures that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the yard structures that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.3 NSSS Equipment Supports

2.4B.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.3, the applicant identified the components of the NSSS equipment supports that are subject to an AMR for license renewal. The applicant described the following NSSS equipment supports that are the plant components that support and restrain the following reactor coolant system equipment:

- reactor vessel
- reactor coolant pumps
- steam generators
- pressurizer

The intended function within the scope of license renewal includes providing structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1).

In LRA Table 2.4.2-34, the applicant identified the following NSSS equipment supports component types that are within the scope of license renewal and subject to an AMR: pressurizer support - bolting, manufactured items, plate and structural shapes; reactor coolant pump support - bolting, manufactured items and snubber attachment hardware, plate and structural shapes; reactor vessel support - bolting, neutron shield tank assembly, plate and structural shapes, sliding support plate; steam generator support - manufactured items and snubber attachment hardware, bolting, plate and structural shapes.

2.4B.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the NSSS equipment supports described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.3.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the NSSS equipment supports that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the NSSS equipment supports that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.4 General Structural Supports

2.4B.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.4, the applicant identified the components of the general structural supports that are subject to an AMR for license renewal. Structural supports for mechanical and electrical components are an integral part of all plant systems. Many of these supports are not uniquely identified with component identification numbers. However, characteristics of the supports, such as design, materials of construction, environments, and anticipated stressors, are similar. Therefore, structural supports for mechanical and electrical components are evaluated as commodities across system boundaries.

Structural supports protect and support equipment that is within the scope of license renewal. Non-safety-related supports prevent interaction between safety-related and non-safety-related components. Other supports provide support for components credited for fire protection, station blackout, anticipated transient without scram, pressurized thermal shock, or environmental qualification of electrical equipment.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-35, the applicant identified the following general structural supports component types that are within the scope of license renewal and subject to an AMR: battery racks; electrical conduit; cable trays; sliding support bearing and sliding surfaces; structural support components (plate, structural shapes, etc.); and vendor-supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.).

2.4B.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the general structural supports described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.4.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the general structural supports that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the general structural supports that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.5 Miscellaneous Structural Commodities

2.4B.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.5, the applicant identified the components of the miscellaneous structural commodities that are subject to an AMR for license renewal. Miscellaneous structural commodities are within the scope of license renewal because they meet provides safety-related functions, 10 CFR 54.4(a)(2) by supporting safety-related component functions, and/or

10 CFR 54.4(a)(3) by supporting environmental qualification, fire protection, station blackout, anticipated transient without scram, and pressurized thermal shock regulations.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides enclosure, shelter, or other protection for in-scope equipment (including radiation shielding and pipe-whip restraint)
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)
- provides EQ barrier and/or HELB barrier
- provides a protective barrier for internal/external flooding events
- provides a pressure boundary

In LRA Table 2.4.2-36, the applicant identified the following miscellaneous structural commodities component types that are within the scope of license renewal and subject to an AMR: bus duct enclosures; cable tray cover assembly; electrical component supports within cabinets and panels; expansion joint/seismic gap material (between adjacent buildings/structures); expansion joint/seismic gap material (fire-rated walls); fire boots; fire doors and/or EQ barrier doors; fire resistant coating; fire stops; fire-rated duct wrap; fire/EQ barrier penetration seals (including ceramic damming material); flood gate gasket; flood gates; flood prevention plugs; gaskets in junction, terminal, and pull boxes; gypsum boards; junction, terminal, and pull boxes; panels and cabinets; roof hatch seals; switchgear enclosures; watertight door gasket; and watertight doors.

2.4B.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.5 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the miscellaneous structural commodities described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.5.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the miscellaneous structural commodities that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the miscellaneous structural commodities that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.4B.6 Load Handling Cranes and Devices

2.4B.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.6, the applicant identified the components of the load handling cranes and devices that are subject to an AMR for license renewal. The load handling cranes and devices are within the scope of license renewal because certain load handling cranes and devices are Seismic Category I and meet 10 CFR 54.4(a)(1), or are seismically designed and meet 10 CFR 54.4(a)(2) to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

Intended functions within the scope of license renewal include the following:

- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(2) or (a)(3)
- provides structural and/or functional support to equipment meeting 10 CFR 54.4(a)(1)

In LRA Table 2.4.2-37, the applicant identified the following load handling cranes and devices component types that are within the scope of license renewal and subject to an AMR: cranes and monorails including bridge & trolley support members (girders, beams, angles, frames, plates, rails & anchorage); fuel elevator support members (structural plates, track & anchorage); and fuel transfer system support members (structural base supports, tracks, & anchorage).

2.4B.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.6 and the referenced Millstone FSAR Sections. The staff's review was conducted in accordance with the guidance described in Section 2.4 of the NUREG-1800.

In conducting its review, the staff evaluated the structural or component functions of the load handling cranes and devices described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then verified that the passive, long-lived components were subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.4B.6.3 Conclusion

The staff reviewed the LRA and related structural/component information to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR were not identified by the applicant.

No omissions were identified. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the load handling cranes and devices that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the load handling cranes and devices that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.5 Scoping and Screening Results - Electrical and Instrumentation and Controls Systems

This section documents the staff's review of the applicant's scoping and screening results for electrical and instrumentation and controls (I&C) systems. Specifically, this section discusses the following systems:

- cables and connectors
- electrical penetrations
- bus duct

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must identify and list passive, long-lived electrical and I&C systems and components that are within the scope of license renewal and subject to an AMR. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results. This approach allowed the staff to confirm that there were no omissions of electrical and I&C system components that meet the scoping criteria and are subject to an AMR.

Staff Evaluation Methodology. The staff's evaluation of the information provided in the LRA was performed in the same manner for all electrical and I&C systems. The objective of the review was to determine if the components and supporting structures for a specific electrical and I&C system that appeared to meet the scoping criteria specified in the rule were identified by the applicant as within the scope of license renewal in accordance with 10 CFR 54.4. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Scoping. To perform its evaluation, the staff reviewed the applicable LRA section and associated component drawings, focusing its review on components that had not been identified as within the scope of renewal. The staff reviewed relevant licensing basis documents, including the final safety analysis report (FSAR), for each electrical and I&C system component to determine if the applicant had omitted components with intended functions delineated in 10 CFR 54.4(a) from the scope of license renewal. The staff also reviewed the licensing basis documents to determine if all intended functions delineated in 10 CFR 54.4(a) were specified in the LRA. If omissions were identified, the staff requested additional information to resolve the discrepancies.

Screening. Once the staff's review of the scoping results was completed, the staff evaluated the applicant's screening results. For those structures and components with intended functions, the staff sought to determine if the functions are performed with moving parts or a change in configuration or properties, or if they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). For those that did not meet either of these criteria, the staff sought to confirm that these electrical and I&C system components were subject to an AMR as required by 10 CFR 54.21(a)(1). If discrepancies were identified, the staff requested additional information to resolve them.

2.5.1 Cables and Connectors Systems

2.5.1.1 Summary of Technical Information in the Application

In LRA Section 2.5.1, the applicant described the cables and connectors systems. Cables and associated connectors provide electrical connections to specified sections of an electrical circuit to deliver voltage, current, or signals. Insulation resistance, which precludes shorts, grounds, and unacceptable leakage currents, maintains circuit integrity.

The cables and connectors within the scope of renewal supply electrical/control power and signals for electrical and I&C equipment: (i) that perform safety-related functions; (ii) whose failure could adversely impact the safety-related function of a safety-related component; or (iii) that are relied upon for fire protection (FP), station blackout (SBO), pressurized thermal shock (PTS), or anticipated transients without scram (ATWS). Cables and connectors within the scope of the EQ program are the subject of time-limited aging analyses (TLAAs) as described in LRA Section 4.4, Environmental Qualification of Electric Equipment.

Intended functions within the scope of license renewal include the following:

- conducts electricity
- insulates electrical conductors

In LRA Table 2.5.1-1, the applicant identified the following cables and connectors systems component types that are within the scope of license renewal and subject to an AMR: conductors and insulation.

2.5.1.2 Staff Evaluation

The staff reviewed LRA Section 2.5.1 using the evaluation methodology described in Section 2.5 of this SER. The staff conducted its review in accordance with the guidance described in the NRC's Standard Review Plan (NUREG-1800), Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls Systems."

In conducting its review, the staff evaluated the structure and component functions of the cables and connectors described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff did not identify any omissions. The staff then reviewed the LRA to verify that passive or long-lived components were not omitted from being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The applicant states that the cables and connectors within the scope of license renewal meet 10 CFR 54.21 (a)(1), (2) or (3) by supplying electrical control power and signals for electrical and I&C equipment: (i) that performs safety-related functions; (ii) whose failure could adversely impact the safety-related function; or (iii) that is relied upon for fire protection, station blackout, pressurized thermal shock, or anticipated transients without scram. The evaluation boundary for the non-EQ cables and connectors includes cables, connectors, terminations, and cables in storage. The commodity groups that require AMR are indicated in Table 2.5.1-1, “Cables and Connectors.” The commodity group includes conductors and insulation. The function of insulated cables and connections is to electrically connect specified sections of an electrical circuit to deliver voltage, current, or signals. Electrical cables and their connections are reviewed as commodity groups. In RAI 2.5-1, the staff requested the following information:

(1) Table 2.5.1 of the LRA lists electrical cables and connectors not subject to EQ requirements to be subjected to an aging management review (AMR). It did not include splices, and fuse holder (non-metallic portions). The applicant was requested to provide a technical justification of why splices, and fuse holders are excluded from the AMR.

(2) The applicant was requested to discuss whether there are there any non-safety related cables (not within the scope of license renewal) excluded from an AMR that includes cables. If that includes cables, the applicant was requested to discuss how these cables are treated if they run in the same conduits or race ways with the other cables.

(3) The applicant was requested to explain why grounding systems are not within the scope of license renewal.

(4) Section 2.5, Table 2.5.1 of the LRA did not include the transmission connections to be included in the AMR. Transmission connections are within the scope of license renewal, are considered long-lived, passive components and should be included in the AMR. Therefore, the applicant was requested to explain why the transmission connections are excluded from the AMR.

By letter dated November 9, 2004, the applicant responded to the staff’s questions as follows:

(1) The splices are considered an integral part of the cable and non-EQ splices are included in the commodity groups, “Conductors” and “Insulation” in LRA Table 2.5.1-1 and the AMR results are included in LRA table 3.6.2-1. Fuse holders (including non-metallic portions) that are not part of a larger assembly, but support safety-related and non-safety-related functions in which a failure of a fuse precludes a safety function from being accomplished, are subject to AMR and will be evaluated prior to the period of extended operation as described in LRA Section 2.1.6.5. This commitment is identified as Commitment 6 in LRA Appendix A, Table A6.0-1.

The staff finds the applicant’s commitment to be acceptable based on the applicant’s statement, the splices are already included in the LRA Table 3.6.2-1 and it’s commitment to complete the evaluation of fuse holders prior to the period of extended operation, this resolves RAI 2.5-1(1).

(2) The only non-safety-related cables that are not subject to AMR are the Unit 2 control element drive mechanism and Unit 3 control rod drive mechanism cables. In some instances, these cables may be routed in the same raceways as in-scope non-EQ cables. However, since an area-based approach is used to manage the effects of aging for non-EQ cables, as described in LRA Section B2.1.8, “Electrical Cables and Connectors not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” all cables within a raceway are subject to aging management program.

The staff finds the applicant’s response to be acceptable based on the applicant’s clarification that all cables within a raceway are subject to aging management, this resolves RAI 2.5-1(2).

(3) The station grounding system bonds metal raceways, building structural steel, and plant equipment to earth ground through an installed grounding grid. The station grounding system is non-safety related and is provided for personnel and equipment protection. In the event of a fault in an electrical circuit or component, the grounding system includes the capability to detect and/or isolate the fault to minimize equipment damage. The grounding system does not prevent faults and is not required for equipment operation. Failure of the system cannot affect the accomplishment of any safety functions. Therefore, the system does not perform an intended function that meets the criteria of 10 CFR 54.4(a) and is not within the scope of license renewal.

The staff finds the applicant's response to be acceptable based on the applicant's clarification that the grounding system does not prevent faults and is not required for equipment operation, this resolves RAI 2.5-1(3).

(4) Transmission connections are within the scope of license renewal and subject to AMR. Transmission connections are included in the commodity group "Conductors" in LRA Table 2.5.1-1.

The staff finds the applicant's response to be acceptable based on the applicant's clarification that transmission connections are included in Table 2.5.1-1, this resolves RAI 2.5-1(4).

2.5.1.3 Conclusion

During its review of the information provided in the LRA, license renewal drawings, and RAI responses discussed above, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components of the cables and connectors. Therefore, the staff concludes that the applicant has adequately identified the cables and connectors systems components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the cables and connectors systems components that are subject to an AMR, as required by 10 CFR 54.21(a)(1). However, fuse holders (including non-metallic portions) that are not part of a larger assembly, will be evaluated prior to the period of extended operation as described in LRA Section 2.1.6.5. This commitment is identified as Commitment 6 in LRA Appendix A, Table A6.0-1.

2.5.2 Electrical Penetrations Systems

2.5.2.1 Summary of Technical Information in the Application

In LRA Section 2.5.2, the applicant described the electrical penetrations systems. Electrical penetrations permit the conduction of electrical power or signals through the containment wall while maintaining the integrity of the containment pressure boundary.

The electrical penetrations provide a seal between the containment and the outside atmosphere. The electrical penetration assemblies within the scope of the EQ program are the subject of a TLAA as described in LRA Section 4.4, Environmental Qualification of Electric Equipment.

Intended functions within the scope of license renewal include the following:

- conducts electricity
- insulates electrical conductors
- provides a pressure boundary
- provides structural and/or functional support related to mechanical components

In LRA Table 2.5.2-1, the applicant identified the following electrical penetrations systems component types that are within the scope of license renewal and subject to an AMR: conductors; feed-through module; header plates; bolting hardware; compression connectors; feed-through sealant; insulation; internal conductor support; and penetration seals.

2.5.2.2 Staff Evaluation

The staff reviewed LRA Section 2.5.2 using the evaluation methodology described in Section 2.5 of this SER. The staff conducted its review in accordance with the guidance described in the NRC's Standard Review Plan (NUREG-1800), Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls Systems."

In conducting its review, the staff evaluated the structure and component functions of the electrical penetrations systems described in the LRA and Millstone FSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

Electrical penetrations are used to pass electrical circuits through the containment wall while maintaining containment integrity. They provide electrical continuity for the circuit as well as a pressure boundary for the containment. The electrical penetrations are within the scope of license renewal because they provide a seal between the containment and the outside atmosphere. All primary containment electrical penetrations are included in the scope of the rule. The electrical continuity function of penetrations is managed under the EQ program which is discussed in Section 4.4, "Environmental Qualification of Electrical Equipment." The evaluation boundary of the non-EQ electrical penetrations includes the sealed conductor feed-through module. The components subject to an AMR are indicated in Table 2.5.2.1, "Electrical Penetrations." The results of the AMR of these components are provided in Table 3.6.2-2: Electrical Components-Electrical Penetrations-Aging Management Evaluation.

The applicant's methodology has adequately addressed the electrical penetrations and is, therefore, acceptable.

2.5.2.3 Conclusion

During its review of the information provided in the LRA, license renewal drawings, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components of the electrical penetrations systems. Therefore, the staff concludes that the applicant has adequately identified the electrical penetrations systems components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the electrical penetrations systems components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.5.3 Bus Duct Systems

2.5.3.1 Summary of Technical Information in the Application

In LRA Section 2.5.3, the applicant described the bus duct systems. A switchyard-type tubular bus duct is a bare, rigid conductor supported on insulator posts or stacks. These insulators are non-porous, translucent, porcelain ceramic covered with an oven-baked glaze. The bus support insulator attaches to the bus duct and a support stand to provide a rigid insulating support for the bus duct.

These switchyard-type tubular bus ducts are required for the restoration of offsite power during a station blackout event.

Intended functions within the scope of license renewal include the following:

- conducts electricity
- insulates electrical conductors
- provides structural and/or functional support related to mechanical components

In LRA Table 2.5.3-1, the applicant identified the following bus duct systems component types that are within the scope of license renewal and subject to an AMR: bus duct and bus support insulator.

2.5.3.2 Staff Evaluation

The staff reviewed LRA Section 2.5.3 using the evaluation methodology described in Section 2.5 of this SER. The staff conducted its review in accordance with the guidance described in the NRC's Standard Review Plan (NUREG-1800), Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls Systems."

In conducting its review, the staff evaluated the systems functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant did not omit from the scope of license renewal any components with intended functions delineated in 10 CFR 54.4(a). The staff then reviewed those components that the applicant identified as being within the scope of license renewal to verify that the applicant did not omit any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The switchyard-type tubular bus ducts are within the scope of license renewal for 10 CFR 54.4(a)(3) since they are required for the restoration of offsite power during a station blackout event. The applicant described the bus ducts in LRA Section 2.5.3 and provided a list of components subject to an AMR in LRA Table 2.5.3-1, "Bus Duct," and 3.6.2-3, "Electrical Components-Bus Duct-Aging Management Evaluation."

The applicant has adequately addressed the bus duct and is, therefore, acceptable.

2.5.3.3 Conclusion

During its review of the information provided in the LRA, license renewal drawings, and licensing basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components of the bus duct systems. Therefore, the staff concludes that the applicant has adequately identified the bus duct systems and components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the bus duct systems components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6 Conclusion for Scoping and Screening

The staff has reviewed the information in Section 2, "Structures and Components Subject to Aging Management Review" of the LRA. The staff determined the applicant's scoping and screening methodology, including its supplement 10 CFR 54.4(a)(2) review which brought additional nonsafety-related piping segments and associated components into the scope of license renewal, was consistent with the requirements of 10 CFR 54.21(a)(1) and the staff's position on the treatment of safety and nonsafety-related SSC's within the scope of license renewal and the structures and components requiring an AMR is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

On the basis of its review, the staff concludes that the applicant has adequately identified those systems and components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified those systems and components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

With regard to these matters, the NRC staff has concluded that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis, and that any changes made to the MPS current licensing basis in order to comply with 10 CFR 54.29(a) are in accord with the Act and the Commission's regulations.

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SECTION 3

AGING MANAGEMENT REVIEW RESULTS

This section of the SER contains the staff's evaluation of the applicant's aging management programs (AMPs) and aging management reviews (AMRs). In Appendix B of the LRA, the applicant described the 25 AMPs that it relies on to manage or monitor the aging of long-lived, passive components and structures.

By letter dated December 3, 2004, the applicant supplemented the program discussions in Appendix B to the license renewal application (LRA) by providing a new AMP, Section B2.1.26, “Bolting Integrity.”

In Section 3 of the LRA, the applicant provided the results of the AMRs for those structures and components that were identified in Section 2 of the LRA as being within the scope of license renewal and subject to an AMR.

3.0 Applicant's Use of the Generic Aging Lessons Learned Report

In preparing its license renewal application (LRA), Dominion Nuclear Connecticut, Inc. (Dominion or the applicant) credited NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," dated July 2001. The GALL Report contains the staff's generic evaluation of the existing plant programs and documents the technical basis for determining where existing programs are adequate without modification and where existing programs should be augmented for the extended period of operation. The evaluation results documented in the GALL Report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components for license renewal without change. The GALL Report also contains recommendations on specific areas for which existing programs should be augmented for license renewal. An applicant may reference the GALL Report in its LRA to demonstrate that the programs at its facility correspond to those reviewed and approved in the report.

The purpose of the GALL Report is to provide the staff with a summary of staff-approved AMPs to manage or monitor the aging of structures and components that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA will be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report also serves as a reference for applicants and staff reviewers to quickly identify those AMPs and activities that the staff has determined will adequately manage or monitor aging during the period of extended operation.

The GALL Report identifies (1) systems, structures, and components (SSCs), (2) structure and component (SC) materials, (3) the environments to which the SCs are exposed, (4) the aging effects associated with the materials and environments, (5) the AMPs that are credited with managing or monitoring the aging effects, and (6) recommendations for further applicant evaluations of aging management for certain component types.

To determine whether using the GALL Report would improve the efficiency of the license renewal review, the staff conducted a demonstration project to exercise the GALL process and to determine the format and content of a safety evaluation based on this process. The results of the demonstration project confirmed that the GALL process will improve the efficiency and effectiveness of the LRA review while maintaining the staff's focus on public health and safety. NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications," dated April 2001 (SRP-LR), was prepared based on both the GALL Report model and lessons learned from the demonstration project.

The staff performed its review in accordance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), “Requirements for Renewal of Operating Licenses for Nuclear Power Plants,” the guidance provided in NUREG-1800, the guidance provided in NUREG-1801.

In addition to its review of the LRA, the staff conducted onsite audit of selected aging management reviews and associated aging management program as described in the “Audit and Review Plan for Plant Aging Management Reviews and Programs, Millstone Power Station, Units 2 and 3,” dated October 27, 2004, (ADAMS ML043290430). The onsite audits and reviews are designed to maximize the efficiencies of the staff’s review of the LRA. The need for formal correspondence between the staff and the applicant was reduced, and therefore, improved the efficiency of the review. Also the applicant could respond to questions, and the staff could readily evaluate the responses made by the applicant.

3.0.1 Format of the License Renewal Application

The applicant submitted an application that followed the standard LRA format, as agreed to between the NRC staff and the Nuclear Energy Institute (NEI) (see letter dated April 7, 2003, ML030990052). This revised LRA format incorporates lessons learned from the staff's reviews of the previous five LRAs. These previous applications used a format developed from information gained during an NRC staff and NEI demonstration project conducted to evaluate the use of the GALL Report in the staff's review process.

The organization of Section 3 of the LRA parallels Chapter 3 of the SRP-LR. The AMR results information in Section 3 of the LRA is presented in the following two table types:

- Table 1: Table 3.x.1 - where "3" indicates the LRA section number, "x" indicates the subsection number from the GALL Report, and "1" indicates that this is the first table type in Section 3 of the LRA.
- Table 2: Table 3.x.2-y - where "3" indicates the LRA section number, "x" indicates the subsection number of the GALL Report, "2" indicates that this is the second table type in Section 3 of the LRA, and "y" indicates the system table number.

The content of the previous applications and the MPS applications is essentially the same. The intent of the revised format used for the MPS applications was to modify the tables in Chapter 3 to provide additional information to assist the staff in its review. In Table 1 the applicant summarized the portions of the application it considered to be consistent with the GALL Report. In Table 2, the applicant identified the linkage between the scoping and screening results in Chapter 2 and the AMRs in Chapter 3.

3.0.1.1 Overview of Table 1

Table 3.x.1 (Table 1) provides a summary comparison of how the facility aligns with the corresponding tables of the GALL Report, Volume 1. The table is essentially the same as Tables 1 through 6 provided in the GALL Report, Volume 1, except that the "Type" column has been replaced by an "Item Number" column and the "Item Number in GALL" column has been replaced by a "Discussion" column. The "Item Number" column provides the reviewer with a means to cross-reference from Table 2 to Table 1. The "Discussion" column is used by the applicant to provide clarifying/amplifying information. The following are examples of information that might be contained within this column:

- further evaluation recommended - information or reference to where that information is located
- the name of a plant-specific program being used
- exceptions to the GALL Report assumptions
- a discussion of how the line is consistent with the corresponding line item in the GALL Report when that may not be intuitively obvious
- a discussion of how the item is different than the corresponding line item in the GALL Report (e.g., when there is exception taken to an aging management program that is listed in the GALL Report)

The format of Table 1 allows the staff to align a specific Table 1 row with the corresponding NUREG-1801, Volume 1, table row so that consistency can be checked easily.

3.0.1.2 Overview of Table 2

Table 3.x.2-y (Table 2) provides the detailed results of the AMRs for those components identified in LRA Section 2 as being subject to an AMR. The LRA contains a Table 2 for each of the components or systems within a system grouping (e.g., reactor coolant systems, engineered safety features, auxiliary systems, etc.). For example, the engineered safety features group contains tables specific to the containment spray system, containment isolation system, and emergency core cooling system; Table 2 consists of the following nine columns:

(1) Component Type - The first column identifies the component types from Section 2 of the LRA that are subject to aging management review. They are listed in alphabetical order.

(2) Intended Function - The second column contains the license renewal intended functions (including abbreviations where applicable) for the listed component types. Definitions and abbreviations of intended functions are contained within the Intended Functions table of LRA Section 2.

(3) Material - The third column lists the particular materials of construction for the component type.

(4) Environment - The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated and a list of these environments is provided in the Internal Service Environments and External Service Environments tables of LRA Section 3.

(5) Aging Effect Requiring Management - The fifth column lists aging effects requiring management. As part of the aging management review process, the applicant determined any aging effects requiring management for each material and environment combination.

(6) Aging Management Programs - The sixth column lists the aging management programs the applicant used to manage the identified aging effects.

(7) GALL Vol. 2 Item - The seventh column lists the GALL Report item(s) that the applicant identified as being similar to the AMR results in its LRA. The applicant compared each combination of component type, material, environment, aging effect requiring management, and aging management program in Table 2 of the SER to the items in the GALL Report. If there were no corresponding item in the GALL Report, the applicant left the column blank. In this way, the applicant identified the AMR results in the LRA tables that corresponded to items in the GALL Report tables.

(8) Table 1 Item - The eighth column lists the corresponding summary item number from Table 1. If the applicant identifies AMR results in Table 2 that are consistent with the GALL Report, then the associated Table 3.x.1 line summary item number should be listed in Table 2. If there is no corresponding item in the GALL Report, then column eight is left blank. That way, the information from the two tables can be correlated.

(9) Notes - The ninth column lists the corresponding notes that the applicant used to identify how the information in Table 2 aligns with the information in the GALL Report. The notes identified by letters were developed by a Nuclear Energy Institute working group and will be used in future license renewal applications. Any plant-specific notes are identified by a number and provide additional information concerning the consistency of the line item with the GALL Report.

3.0.2 Staff's Review Process

The staff conducted the following three types of evaluations of the AMRs and associated AMPs.

(1) For items that the applicant stated were consistent with the GALL Report, the staff conducted either an audit or a technical review to determine consistency with the GALL Report.

(2) For items the applicant stated were consistent with the GALL Report with exceptions and/or enhancements, the staff conducted either an audit or a technical review of the item to determine consistency with the GALL Report. In addition, the staff conduct either an audit or a technical review of the applicant's technical justification for the exceptions and the adequacy of the enhancements.

(3) For other items, the staff conducted a technical review per 10 CFR 54.21(a)(3).

The staff performed audits and technical reviews of the license renewal applicant’s AMPs and AMRs. These audit and technical reviews are to determine whether the effects of aging on structures and components can be adequately managed so that their intended functions can be maintained consistently with the plant’s current licensing basis (CLB) for the period of extended operation as required by 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants.”

The staff performed onsite audits during the weeks of March 29, May 3, May 10, and June 7, 2004, to verify selected AMPs and AMR results that the applicant claimed were consistent with the GALL Report were actually consistent as claimed. The staff conducted a public exit meeting on July 13, 2004. Details of the staff's onsite audit are documented in the "Audit and Review Report for Plant Aging Management Reviews - Millstone Power Station, Units 2 and 3," dated February 2, 2005 (MPS Audit and Review Report) (ML050330059).

3.0.2.1 Review of AMPs

For those AMPs for which the applicant claimed consistency with the GALL AMPs, the staff conducted either an audit or a technical review to verify that the applicant's AMPs were consistent with the AMPs in the GALL Report. For each AMP that had one or more deviations, the staff evaluated each deviation to determine (1) whether the deviation was acceptable, and (2) whether the AMP, as modified, would adequately manage the aging effect(s) for which it was credited.

For AMPs that were not evaluated in the GALL Report, the staff performed a full review to determine the adequacy of the AMPs. The staff evaluated the AMPs against the following 10 program elements defined in SRP-LR Appendix A.

(1) Scope of the Program - Scope of the program should include the specific structures and components subject to an AMR for license renewal.

(2) Preventive Actions - Preventive actions should prevent or mitigate aging degradation.

(3) Parameters monitored or inspected - Parameters monitored or inspected should be linked to the degradation of the particular structure or component intended functions(s).

(4) Detection of Aging Effects - Detection of aging effects should occur before there is a loss of structure or component intended functions(s). This includes aspects such as method or technique (i.e., visual, volumetric, surface inspection), frequency, sample size, data collection and timing of new/one-time inspections to ensure timely detection of aging effects.

(5) Monitoring and Trending - Monitoring and trending should provide predictability of the extent of degradation, and timely corrective or mitigative actions.

(6) Acceptance Criteria - Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the structure or component intended function(s) are maintained under all CLB design conditions during the period of extended operation.

(7) Corrective Actions - Corrective actions, including root cause determination and prevention of recurrence, should be timely.

(8) Confirmation Process - Confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.

(9) Administrative Controls - Administrative controls should provide a formal review and approval process.

(10) Operating experience - Operating experience of the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.

Details of the staff’s audit evaluation of program elements (1) through (6) is documented in its MPS audit and review report and is summarized in Section 3.0.3 of this SER.

The staff reviewed the applicant's corrective action program and documented its evaluations in Section 3.0.4 of this SER. The staff's evaluation of the corrective action program included assessment of the following program elements: (7) corrective actions, (8) confirmation process, and (9) administrative controls.

The staff reviewed the information concerning the (10) operating experience program element and documented its evaluation in its MPS audit and review report and summarized it in Section 3.0.3 of this SER.

The staff reviewed the Final Safety Analysis Report (FSAR) supplement for each AMP to determine if it provided an adequate description of the program or activity, as required by 10 CFR 54.21(d).

3.0.2.2 Review of AMR Results

Table 2 of the LRA contains information concerning whether or not the AMRs align with the AMRs identified in the GALL Report. For a given AMR in Table 2, the staff reviewed the intended function, material, environment, aging effect requiring management, and aging management program (MEAP) combination for a particular component type within a system. The AMRs that correlate between a combination in Table 2 and a combination in the GALL Report were identified by a referenced item number in column seven, "GALL, Volume 2 Item." The staff also conducted onsite audits to verify the correlation. A blank column seven indicates that the applicant was unable to locate an appropriate corresponding combination in the GALL Report. The staff conducted a technical review of these combinations that were not consistent with the GALL Report. The next column, "Table 1 Item," provided a reference number that indicated the corresponding row in Table 1.

3.0.2.3 FSAR Supplement

Consistent with the SRP-LR, for the AMRs and associated AMPs that it reviewed, the staff also reviewed the FSAR supplement that summarizes the applicant’s programs and activities for managing the effects of aging for the period of extended operation, as required by 10 CFR 54.21(d).

3.0.2.4 Documentation and Documents Reviewed

In performing its review, the staff relied heavily on the LRA, the LRA supplements, the SRP-LR, and the GALL Report.

Also, during the onsite audit, the staff examined the applicant's justification, as documented in the staff's MPS audit and review report, to verify that the applicant's activities and programs will adequately manage the effects of aging on SCs. The staff also conducted detailed discussions and interviews with the applicant's license renewal project personnel and others with technical expertise relevant to aging management.

3.0.3 Aging Management Programs

Table 3.0.3-1 presents the AMPs credited by the applicant and described in Appendix B of the LRA. The table also indicates the GALL program that the applicant claimed its AMP was consistent with (if applicable) and the SSCs for managing or monitoring aging. The section of the safety evaluation report in which the staff's evaluation of the program is documented also is provided.

Table 3.0.3-1 MPS's Aging Management Programs

MPS's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Existing AMPs				
Battery rack inspections (B2.1.1)	Plant-specific	NA	Structures and component supports	3.0.3.3.1
Boraflex monitoring (B2.1.2)	Consistent	XI.M22	Structures and component supports	3.0.3.1.1
Boric acid corrosion (B2.1.3)	Consistent	XI.M10	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; steam and power conversion system; structures and component supports	3.0.3.1.2
Buried pipe inspection program (B2.1.4)	Consistent with exceptions and enhancements	XI.M28, XI.M34	Auxiliary systems	3.0.3.2.1
Chemistry control for primary systems program (B2.1.5)	Consistent with exception	X1.M2	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; structures and component supports	3.0.3.2.2
Chemistry control for secondary systems programs (B2.1.6)	Consistent with exception	XI.M2	Reactor vessel, internals, and reactor coolant system; auxiliary systems; steam and power conversion system	3.0.3.2.3

MPS's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Closed-cycle cooling water system (B2.1.7)	Consistent with exception and enhancement	XI.M21	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; steam and power conversion system	3.0.3.2.4
Electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits (B2.1.9)	Consistent with enhancement	XI.E2	Electrical components	3.0.3.2.6
Fire protection program (B2.1.10)	Consistent with exception and enhancements	XI.M26 XI.M27	Auxiliary systems; structures and component supports	3.0.3.2.7
Flow-accelerated corrosion (B2.1.11)	Consistent with exception	XI.M17	Reactor vessel, internals, and reactor coolant system; steam and power conversion system	3.0.3.2.8
Fuel oil chemistry (B2.1.12)	Consistent with exceptions	XI.M30	Auxiliary systems	3.0.3.2.9
General condition monitoring (B2.1.13)	Plant-specific	NA	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; steam and power conversion system; structures and component supports	3.0.3.3.2
Inaccessible medium-voltage cables not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.14)	Consistent with exception and enhancement	XI.E3	Electrical components	3.0.3.2.10
Inservice inspection program: containment inspections (B2.1.16)	Consistent with exceptions	XI.S1 XI.S2 XI.S4	Structures and component supports	3.0.3.2.11
Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with exceptions and enhancements	XI.M12 XI.M13 XI.M16	Reactor vessel, internals, and reactor coolant system	3.0.3.2.12

MPS's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with exceptions and enhancements	XI.M1 XI.M3 XI.M11 XI.M12 XI.S3	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; structures and component supports	3.0.3.2.13
Inspection activities: load handling cranes and devices (B2.1.19)	Consistent with enhancements	XI.M23	Structures and component supports	3.0.3.2.14
Reactor vessel surveillance (B2.1.20)	Consistent	XI.M31	Reactor vessel, internals, and reactor coolant system	3.0.3.1.3
Service water system (open-cycle cooling) (B2.1.21)	Consistent with exceptions	XI.M20	Auxiliary systems	3.0.3.2.15
Steam generator structural integrity (B2.1.22)	Consistent	XI.M19	Reactor vessel, internals, and reactor coolant system	3.0.3.1.4
Structures monitoring program (B2.1.23)	Consistent with enhancements	XI.S5 XI.S6 XI.S7	Structures and component supports	3.0.3.2.16
Tank inspection program (B2.1.24)	Consistent with enhancements	XI.M29	Engineered safety features; auxiliary systems; steam and power conversion system	3.0.3.2.17
Work control process (B2.1.25)	Plant-specific	NA	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; steam and power conversion system; structures and component supports	3.0.3.3.4
Bolting integrity (B2.1.26)	Consistent with exception	XI.M18	Reactor vessel, internals, and reactor coolant system; engineered safety features; auxiliary systems; steam and power conversion system	3.0.3.2.18
New AMPs				
Electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.8)	Consistent with enhancement	XI.E1	Electrical components	3.0.3.2.5
Infrequently accessed areas inspection program (B2.1.15)	Plant-specific	NA	Auxiliary systems; structures and component supports	3.0.3.3.3

3.0.3.1 AMPs that are Consistent with the GALL Report

In Appendix B of the LRA, the applicant indicated that the following AMPs were consistent with the GALL Report:

- Boraflex monitoring (B2.1.2)
- boric acid corrosion (B2.1.3)
- reactor vessel surveillance (B2.1.20)
- steam generator structural integrity (B2.1.22)

3.0.3.1.1 Boraflex Monitoring

Summary of Technical Information in the Application. The applicant's Boraflex monitoring program is described in LRA Section B2.1.2, "Boraflex Monitoring." In the LRA, the applicant stated that this is an existing program. This program is consistent with GALL AMP XI.M22, "Boraflex Monitoring."

The applicant stated, in the LRA, that the Boraflex monitoring program manages the aging effect of change of material properties on the sheets of neutron-absorbing materials affixed inside spent fuel racks at Unit 2. For the Boraflex panels, gamma irradiation and long-term exposure to the wet pool environment cause shrinkage, which results in gap formation, gradual degradation of the polymer matrix, and the release of silica to the spent fuel storage pool water. The resultant loss of boron carbide from the neutron-absorbing sheets reduces the neutron absorption capabilities. The program ensures that periodic testing and monitoring is performed to verify the condition of the neutron-absorbing panels in the spent fuel storage pool.

The applicant also stated, in the LRA, that Boraflex panels are installed in the Unit 3 spent fuel racks but are not credited for neutron absorption and criticality prevention of the spent fuel pool. For that reason, the Boraflex monitoring program at MPS Unit 3 is not included in this AMP.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the MPS audit and review report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

Based on its review, the staff concludes that the applicant's Boraflex monitoring program provides reasonable assurance of aging management of change of material properties on the sheets of neutron-absorbing materials affixed inside spent fuel racks at Unit 2. The staff finds this AMP acceptable because it conforms to the recommended program description, program elements, and acceptance criteria for the Boraflex monitoring program, as discussed in GALL AMP XI.M22, "Boraflex Monitoring."

Also, the applicant stated, in the MPS LRA, that Boraflex panels are installed in the MPS Unit 3 spent fuel racks but the panels are not credited for neutron absorption and criticality prevention of the spent fuel pool. For that reason, the Boraflex monitoring program at MPS Unit 3 is not included in this AMP. Since the applicant did not credit spent fuel racks with Boraflex panels for neutron absorption and criticality prevention of the spent fuel pool for MPS Unit 3, the staff agrees that the Boraflex monitoring program is not applicable to MPS Unit 3.

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.2 Boric Acid Corrosion

Summary of Technical Information In the Application. The applicant summarizes the boric acid corrosion program in Section B2.1.3 of Appendix B to the LRA. In Section B2.1.3 of the LRA, the applicant stated that the AMP is used to manage loss of material in areas where carbon steel, low-alloy steel, copper and cast iron structures and components may be susceptible to the effects of borated reactor coolant leaks. The program ensures that boric acid corrosion is consistently identified, documented, evaluated, and trended so that loss of material is effectively repaired. The applicant stated that this AMP is developed to address industry recommendations reflected in Generic Letter (GL) 88-05 and the information from NRC Bulletins 2002-01 and 2002-02.

Staff Evaluation. The applicant stated that the borated water leakage assessment and evaluation program has been developed to address industry recommendations reflected in GL 88-05, and that the AMP is consistent with the program attributes in GALL AMP XI.M10, "Boric Acid Corrosion." In addition, the recommendations of NRC Bulletins 2002-01 and 2002-02 have been addressed in this program. It should be noted that Bulletins 2003-02 and 2004-01, and NRC Order EA-03-009 provide additional documentation of industry experience related to cracking in ASME Class 1 nickel-alloy partial-penetration welds, including those used to join the upper RV head penetration nozzles to the upper RV heads and those used to join the bottom mounted instrumentation (BMI) nozzles to the lower RV heads of PWRs. The staff requested additional clarification regarding the scope of the boric acid program and the process the applicant uses to augment the list of components within the scope of the AMP based on pertinent industry experience. Specifically, the staff requested the following actions of the applicant in RAI B2.1.3-1:

> Corrective actions have been effectively implemented to mitigate active leakage prior to experiencing a loss of intended function. Discuss how program revisions have incorporated lessons learned from the Davis-Besse vessel head degradation, the control rod drive mechanism penetration cracking and the bottom mounted instrumentation (BMI) nozzles to the lower RV heads discussed in NRC Bulletins 2002-01, 2002-02, 2003-02, and NRC Order EA-03-009 to prevent reoccurrence of degradation caused by boric acid leakage, as required by Generic Letter 88-05. This discussion should include the identification of component locations that have been added to the scope of the program and clarify what type of visual examinations (i.e., specify whether VT-1, VT-2 or VT-3, and whether the visual examinations are enhanced, bare-surface, qualified, etc.) will be performed on the components.

In response to RAI B2.1.3-1, in a letter dated December 3, 2004, the applicant provided the following representative list of applicable component locations and corresponding examination methods, which have been incorporated into the boric acid corrosion control (BACC) program to address operating experience, lessons learned from Davis Besse, the identified NRC bulletins, and the identified NRC order:

Unit 2

- After Fort Calhoun reported leakage from a pressurizer heater or instrument penetration in December 2001, Millstone added the bare metal visual examination of heater sleeves and instrument nozzles on the pressurizer to the GL 88-05 inspection procedure starting with the April 2002 refueling outage (2R14) for Millstone Unit 2. These examinations found two leaking heater sleeves. Both were repaired with Mechanical Nozzle Seal Assembly (MNSA) clamps.
- In the fall of 2002, bare metal examinations of the instrument nozzles on the reactor coolant piping and steam generators for Millstone Unit 2 were added to the inspection procedure.
- In February 2003, Dominion instituted a corporate level program to manage borated water leakage for Millstone, North Anna, and Surry.
- In the fall outage of 2003 (2R15), Millstone Unit 2 performed bare metal visual examinations of the pressurizer heater sleeves and all of the instrument nozzles and repeated 100 percent ultrasonic testing (UT) of the reactor pressure vessel penetrations in accordance with NRC Order EA-03-009. Two leaking heater sleeves and 11 cracked reactor pressure vessel penetrations were identified. All of the heater sleeves and reactor vessel head penetrations were repaired. No leakage was found on any of the instrument nozzles.
- Prior to 3R09, the Boric Acid Corrosion Control (BACC) program procedure was revised into four separate implementing procedures to address the overall program requirements, on-line walkdowns, refueling outage walkdowns, and boric acid corrosion evaluations.
- Prior to outage 2R16, Millstone Unit 2 will add bare metal visual examinations of Alloy 82/182 butt welds in the reactor coolant system to the BACC program.
- As identified in letter S/N 04-140 from Ms. Leslie N. Hartz, Dominion Nuclear Connecticut, to U. S. Nuclear Regulatory Commission, dated June 3, 2004; Dominion announced its intention to replace the pressurizer for Millstone Unit 2 using materials that are resistant to PWSCC. Dominion intends to replace the Unit 2 pressurizer during the Fall 2006 refueling outage.

Unit 3

- In the fall outage of 2002 (3R08), Millstone Unit 3 performed bare metal visual examinations of the reactor vessel head penetrations under the insulation of the reactor vessel head even though it was in the low susceptibility category according to NRC Bulletin 2002-02. 3R08 was the first outage after NRC Bulletin 2002-02 was issued. The results of this examination concluded that there was no evidence of material degradation or RCS leakage.
- In February 2003, Dominion instituted a corporate level program to manage borated water leakage for Millstone, North Anna, and Surry.

- After the Unit 2 fall outage of 2003 (2R15), bare metal visual examinations of Alloy 82/182 butt welds in the Millstone Unit 3 reactor coolant system (RCS) were added to the inspection procedure. Bare metal visual examinations of Alloy 600 Resistance Temperature Detectors (RTDs) on Millstone Unit 3 were added to the program as a result of operating experiences from North Anna and Surry. Bare metal visual examination of the bottom mounted instrumentation (BMI) nozzles on Millstone Unit 3 was added in accordance with NRC Bulletin 2003-2.
- Prior to 3R09, the Boric Acid Corrosion Control (BACC) program procedure was revised into four separate implementing procedures to address the overall program requirements, on-line walkdowns, refueling outage walkdowns, and boric acid corrosion evaluations.
- During outage 3R09, Millstone Unit 3 performed bare metal visual examinations for alloy 82/182 butt welds (except for RPV nozzles). This included the pressurizer and steam generator pipe connections. Bare metal visual examinations were performed for the BMI nozzles in accordance with NRC Bulletin 2003-02.

In issuing RAI B2.1.3-1, the staff inquired as to the process the applicant would use to augment the list of components within the scope of the boric acid corrosion program as based on pertinent industry experience. This was done, in part, to account for any industry experience on borated water leakage events that could possibly impact the AMP prior to the time of the pending issuance of the renewed operating licenses for the Millstone units. For example, NRC Bulletin 2004-01, Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors (May 28, 2004), provided industry experience that demonstrated that Alloy 600 base metal and Alloy 82/182 weld components used in pressurizer penetration nozzles and steam space piping connections may be susceptible to PWSCC and reactor coolant leakage. Since the staff's issuance of NRC Bulletin 2004-01, the applicant's response to RAI B2.1.3-1 confirms that the applicant is updating the list of components within the scope of the applicant's boric acid corrosion program based on pertinent industry experience on reactor coolant leakage events and that the applicant has included Alloy 600 base metal and Alloy 82/182 weld components as being within the scope of the boric acid corrosion program assessment and evaluation program. This includes the Alloy 600 base metal and Alloy 82/182 weld metal components in the pressurizer system specified in NRC Bulletin 2004-01.

The staff and the industry are currently pursuing resolution of the issues raised and discussed in NRC Bulletin 2004-01 on PWSCC and reactor coolant leakage in pressurizer penetrations and steam space piping connections. Because this is an emerging issue that has yet to be resolved, but will be resolved during the current operating terms for the Millstone units, consideration of these issues is beyond the scope of this license renewal review, pursuant to 10 CFR 54.30(b). However, it should be noted that as identified in Dominion letter S/N 04-140 from Ms. Leslie N. Hartz, Dominion Nuclear Connecticut, to U. S. Nuclear Regulatory Commission, dated June 3, 2004, Dominion announced its intention to replace the pressurizer for Millstone Unit 2 during the fall 2006 refueling outage using materials that are resistant to PWSCC. The replacement of the pressurizer would resolve the current issues concerning PWSCC in the pressurizer penetrations for Millstone Unit 2. For other susceptible nickel-based piping connections, in Millstone Unit 2, the applicant has a commitment to follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. This commitment is identified in the Millstone Unit 2 LRA, Appendix A, Table A6.0-1 License Renewal Commitments, Item 14. Millstone Unit 3 does not have nickel-based pressurizer penetrations. However, Millstone Unit 3 does have nickel-based alloy welds attaching the safe ends to the pressurizer surge nozzle and the pressurizer relief, spray and safety valve nozzles. To manage these welds, the applicant has a commitment to follow the industry efforts investigating the aging effects applicable to susceptible nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. This commitment is identified in the Millstone Unit 3 LRA, Appendix A, Table A6.0-1 License Renewal Commitments, Item 15.

Based on this assessment, the staff concludes that the program is applying pertinent generic communications on borated reactor coolant leakage events as the basis for augmenting the scope of the boric acid corrosion program and that the program has been updated to include Alloy 600 base metal and Alloy 82/182 weld metal components in addition to implementing industry efforts to manage aging of PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals.

Section B2.1.3 of the LRA also states that the program addresses the structures and components composed of susceptible materials, which includes carbon and low-alloy steel, copper, and cast iron. The program inspects the surfaces of structures and components from which borated water may leak. The boric acid corrosion program includes systematic measures to ensure that corrosion caused by leaking borated coolant does not lead to degradation of the leakage source or adjacent structures or components. However, the applicant did not address electrical components on which borated coolant may leak onto as recommended by GALL AMP XI.M10. This should be added to the LRA and FSAR supplement, and was addressed in RAI B2.1.3-3a.

In response to RAI B2.1.3-3a in a letter dated December 3, 2004, the applicant stated that design features such as those detailed in LRA Table 3.6.1, Item Number 3.6.1-05, provide physical protection and prevent the corrosion of the connector contact surfaces caused by intrusion of borated water. In addition, the boric acid corrosion program uses visual inspections to detect the boric acid leakage source, path and any targets of boric acid leakage. The applicant is also clarifying the scope of the program in the FSAR supplement by including the following information in Section A2.1.3 of the Unit 2 FSAR supplement and Section A2.1.2 of the Unit 3 FSAR supplement; “The program uses visual inspections to detect the boric acid leakage source, path and any targets of the leakage.” Therefore, the staff finds that the program includes all potential targets, including electrical components, as recommended by NUREG-1801 to manage the degradation of these components.

In addition, some components and structures that are not adjacent to the leakage source may still be targets of the borated coolant. Therefore, the staff asked the applicant in RAI B2.1.3-3b that this AMP should reflect that targets include adjacent systems and components to the leakage source and systems and components that may be leaked on, such as components that are spatially under the leakage source, yet are not directly adjacent to the source.

In response to RAI B2.1.3-3b in a letter dated December 3, 2004, the applicant stated that the boric acid corrosion program uses visual inspections to detect the boric acid leakage source, path and any targets of the leakage. This program inspects the surfaces of structures and components from which the borated water may have leaked, and confirms whether degradation has occurred for any potential targets of the identified leakage. In determining the path of boric acid leakage, the applicable adjacent systems and components are identified, as well as systems and components that are spatially located under the leakage and which may have become targets of the leakage. The program is consistent with NUREG-1801, and the applicant will clarify the scope of the program by including the following:

> The boric acid corrosion program uses visual inspections to detect the boric acid leakage source, path and any targets of the leakage.

The staff finds the response to this RAI acceptable, since the boric acid corrosion program in the LRA is consistent with GALL AMP XI.M10 “Boric Acid Corrosion,” and the applicant clarified the scope of the program to include any potential target of boric acid leakage.

FSAR Supplement. The applicant provides the following FSAR supplement summary description for the boric acid program in Section A2.1.3 of Appendix A to the LRA:

> Boric Acid Corrosion corresponds to NUREG-1801, Section XI.M10 “Boric Acid Corrosion.” The program manages the aging effect of loss of material and ensures that systems, structures, and components susceptible to boric acid corrosion are properly monitored. It ensures that boric acid corrosion is consistently identified, documented, evaluated, trended and effectively repaired. The acceptance criterion is the absence of any boric acid leakage or precipitation. If boric acid leakage or precipitation is found by any personnel, it is required to be reported using the Corrective Action Program. Corrective action for conditions that are adverse to quality are performed in accordance with the Corrective Action Program as part of the Quality Assurance Program. The corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

The applicant’s FSAR supplement summary description for the boric acid program provides a general reference to commitments made to GL 88-05 and NRC Bulletins. The staff requested that the applicant amend the FSAR supplement summary description to provide more specific references to the applicant’s response (i.e., Dominion’s response) to GL 88-05, and to any additional responses to NRC generic communications (i.e., Generic Letters, Bulletins, Orders, or Circular Letters) that are germane to the scope for the AMP, including those responses to NRC Bulletin 2002-01, 2002-02 and 2003-02 and to NRC Order EA-03-009, as appropriate. The staff issued these requests in RAI B2.1.3-2.

In response to RAI B2.1.3-2, in a letter dated December 3, 2004, the applicant provided the following information:

> Dominion’s response to Generic Letter 88-05 and subsequent NRC communications on boric acid corrosion and leakage detection, which include NRC Bulletins 2001-01, 2002-02 and 2003-02, and NRC Order EA-03-009 (as revised) are part of the current licensing basis (CLB) for Millstone Units 2 and 3. In accordance with 10 CFR 54, the CLB will carry forward into the period of extended operation. The specific responses to these NRC generic communications for Millstone Units 2 and 3 are readily retrievable in the NRC Public Document Room. Dominion feels that providing these commitment

details in the FSAR supplement summary would be inconsistent with the level of detail normally presented in the FSAR supplement.

The staff issued RAI B2.1.3-2 to assure that the applicant's discussion in its FSAR supplement summary description for the borated water leakage assessment and evaluation program was consistent with relevant NRC generic communications and the CLB for the plants. The applicant's response to RAI B2.1.3-3b indicates that the applicant will not amend the FSAR supplement summary description for the borated water leakage assessment and evaluation program to include a reference to the applicant's responses and commitments provided in the applicant's responses to NRC Bulletins 2001-01, 2002-01, 2002-02, 2003-02, and the response to NRC Order EA-03-009, as amended by applicant's response to the first revision of the Order. The staff found this unacceptable because the summary description was not current with the CLB for the facilities and did not reference Dominion's responses and commitments to NRC generic communications that are relevant to the scope and implementation of the AMP. It should be noted that as discussed above, the LRA only addressed Generic Letter (GL) 88-05, and NRC Bulletins 2002-1 and 2002-2. NRC Bulletin 2003-02 and NRC Order EA-03-009 were not included in the LRA. Therefore, the staff requested that the applicant amend the FSAR supplement to ensure that the summary description is current with the CLB for the facilities and references Dominion's responses and commitments to NRC generic communications that are relevant to the scope and implementation of the AMP. This is consistent with other applicants that have included its responses and commitments to NRC Bulletins 2001-01, 2002-01, 2002-02, 2003-02, and the response to NRC Order EA-03-009.

In response to supplemental RAI B2.1.3-2 in a letter dated February 8, 2005, the applicant stated that the FSAR supplement will be revised to identify of the applicable NRC generic communications that the program implements, including NRC Bulletin 2003-02 and NRC Order EA-03-009. The applicant response is acceptable since it will revise the FSAR supplement to include the applicable NRC generic communications that are relevant to the scope of and implementation of this AMP. This resolves RAI B2.1.3-2.

Conclusion. On the basis of its review, the staff finds that the program will adequately manage the aging effects so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.3 Reactor Vessel Surveillance Program

The staff's regulatory bases for the establishment of the applicant's reactor vessel surveillance programs (RVSPs) for Millstone, Units 2 and 3 are specified in Appendix H to Part 50 of Title 10, *Code of Federal Regulations* (10 CFR Part 50, Appendix H).

Summary of Technical Information in the Application. The applicant's RVSP is discussed in LRA Section B2.1.20, "Reactor Vessel Surveillance." The applicant stated that the program is consistent with and takes no exceptions to GALL AMP XI.M31, "Reactor Vessel Surveillance."

Staff Evaluation The staff's evaluation of the RVSP is based on its review of the program description in LRA Section B2.1.20, as supported with pertinent information reported in the staff's MPS audit and report. The staff's criteria for accepting the RVSP are based on both conformance with aging management program (AMP) XI.M31, "Reactor Vessel Surveillance," in

NUREG-1801, and compliance with the applicable requirements of 10 CFR Part 50, Appendix H. The staff also reviewed the FSAR supplement to determine whether it provides an adequate description of the program. Furthermore, the staff reviewed the applicant's evaluation to determine whether it addressed the additional issues recommended in NUREG-1801 and confirmed that the AMP would adequately address these issues.

The applicant's AMP, Section B2.1.20 of Appendix B to the LRA, and the FSAR supplement provide a general description of the RVSP for Millstone, Units 2 and 3 and state that it is consistent with the guidelines of Section XI.M31, "Reactor Vessel Surveillance," of NUREG-1801. However, the staff notes that 10 CFR Part 50, Appendix H, requires licensees to submit any proposed changes to their RVSP withdrawal schedules to the NRC for review and approval. In addition, Items 5 through 7 in NUREG-1801, Section XI.M31, "Reactor Vessel Surveillance," provide recommendations for the withdrawal schedule of the RVSP capsules during the period of license renewal. The staff requested that the applicant identify how the Millstone, Units 2 and 3, capsule withdrawal schedule for the period of license renewal complies with Items 5 through 7 in NUREG-1801, AMP XI.M31.

The response for RAI B2.1.20-1(1), provided in a letter dated December 3, 2004, is discussed below for Items 5 through 7 of NUREG-1801 and the requirements of 10 CFR Part 50, Appendix H:

<u>Unit 2</u>

- Appendix H of 10 CFR Part 50 requires licensees to submit any proposed changes to their RVSP withdrawal schedules to the NRC for review and approval. The applicant stated that Dominion will revise the surveillance capsule withdrawal schedule from 40 to 60 years (54 EFPY) for Millstone Unit 2, consistent with NUREG-1801, AMP XI.M31, item 5. To ensure that this reporting requirement will carry forward after the Millstone operating license have been renewed, the staff is imposing the following condition in the renewed license for Millstone, Unit 2:

  > All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

- Item 5 in NUREG-1801, section XI.M31 provides guidelines for changes to the withdrawal schedule for capsules with a projected fluence of less than 60-year fluence at the end of 40 years. The applicant stated that Dominion is consistent with Item 5 of NUREG-1801, section XI.M31. The applicant is consistent with this item because their capsules will have a projected fluence of less than 60-year fluence at the end of 40 years. In addition the applicant will include withdrawal and testing of at least one of the three remaining capsules during the period of extended operation. This methodology is consistent with the recommendations of NUREG-1801, AMP XI.M31, Item 5 to withdraw a capsule during the period of extended operation to monitor the effects of long-term exposure to neutron irradiation, and therefore the staff finds this acceptable

- Item 6 of NUREG-1801, AMP XI.M31 provides guidelines for changes to the withdrawal schedule for capsules with a projected fluence exceeding the 60-year fluence at the end of 40 years. This item also recommends the applicant to withdraw one capsule at an outage in which the capsule receives a neutron fluence equivalent to the 60-year fluence and test the capsule in accordance with the requirements of ASTM E 185. The staff notes that this item does not apply to Millstone Unit 2 since it will not have surveillance capsules with a projected fluence exceeding the 60-year fluence at the end of 40 years.

- Item 7 of NUREG-1801, AMP XI.M31 provides a recommendation for applicants without in-vessel capsules to use alternative dosimetry to monitor neutron fluence during the period of extended operation. The applicant has three standby capsules, of which at least one will be removed during the period of extended operation. This will provide up to two capsules to monitor neutron fluence during the period of extended operation. In addition, the applicant has stated if the last Millstone Unit 2 capsule is removed prior to year 55, Dominion will provide additional dosimetry for the reactor pressure vessel. This is consistent with the recommendations of NUREG-1801 AMP XI.M31, Item 7, and the staff finds this acceptable.

For reactor vessels with high lead factors, the standby capsules are recommended by NUREG-1801, AMP XI.M31 to be removed and placed in storage. Therefore, the staff requested the applicant in RAI B2.1.20-1(2) to provide the lead factors for Millstone Unit 2. In addition, the applicant was requested to discuss how capsules with high lead factors are stored to ensure that they are not disposed.

In response to RAI B2.1.20-1(2), in a letter dated December 3, 2004, the applicant stated that the lead factor for the remaining Millstone Unit 2 surveillance capsules is approximately 1 (0.97 to 1.31). Therefore, the applicant will withdraw one or more of these capsules in the extended period of operation. The staff finds this response acceptable since the applicant has provided the requested information. This resolves RAI B2.1.20-1(2) for Millstone Unit 2. Since there can be up to two standby capsules in the Unit 2 reactor vessel, these capsules have the potential to be removed for storage. However, the staff notes that currently, there is no detailed guidance regarding the treatment of standby capsules. Therefore, the staff has imposed the following license condition to ensure that any surveillance capsules removed from the Millstone unit, without the intent to test them, are maintained in a condition which would permit their future use, including the period of extended operation, if necessary:

> All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

The imposition of this license condition is consistent with actions that the staff has taken with other, recent license renewal applicants with respect to the control of “standby” RPV surveillance capsules and reporting requirements.

Unit 3

- 10 CFR Part 50, Appendix H requires licensees to submit any proposed changes to their RVSP withdrawal schedules to the NRC for review and approval. The applicant stated that Dominion will revise the surveillance capsule withdrawal schedule from 40 to 60 years (54 EFPY) for Millstone Unit 3, consistent with NUREG-1801, AMP XI.M31, item 6. To ensure that this reporting requirement will carry forward after the Millstone operating license have been renewed, the staff is imposing the following condition in the renewed license for Millstone, Unit 3:

> All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

- Item 5 in NUREG-1801, section XI.M31 provides guidelines for changes to the withdrawal schedule for capsules with a projected fluence of less than 60 year fluence at the end of 40 years. The applicant stated that the Millstone Unit 3 surveillance program consists of capsules with a projected fluence of less than 60 year fluence at the end of 40 years. The staff notes that this item does not apply to Millstone Unit 3 since it will not have surveillance capsules with a projected fluence of less than 60 year fluence at the end of 40 years.

- Item 6 of NUREG-1801, AMP XI.M31 provides guidelines for changes to the withdrawal schedule for capsules with a projected fluence exceeding the 60 year fluence at the end of 40 years. This item also recommends the applicant to withdraw one capsule at an outage in which the capsule receives a neutron fluence equivalent to the 60-year fluence and test the capsule in accordance with the requirements of ASTM E 185. The applicant stated that the Millstone Unit 3 surveillance program consists of capsules with a projected fluence exceeding the 60 year fluence at the end of 40 years. The applicant also stated that Millstone Unit 3 will withdraw capsule W when it receives a neutron fluence equivalent to 60 year fluence (approximately 54EFPY). This capsule will be tested in accordance with the requirements of ASTM E 185. The staff finds this response acceptable since it is consistent with the recommendations of NUREG-1801 AMP XI.M31, Item 6.

- Item 7 of NUREG-1801, AMP XI.M31 provides a recommendation for applicants without in-vessel capsules to use alternative dosimetry to monitor neutron fluence during the period of extended operation. The applicant stated that there are three standby capsules in Millstone

Unit 3 that will be removed prior to these capsules receiving neutron fluence equivalent to 60 year fluence. One of these may be selected to remain in place for the purpose of flux monitoring, but will be over-irradiated in terms of meaningful metallurgical information. If the last capsule is withdrawn prior to year 55, Dominion will provide additional dosimetry for the reactor pressure vessel. The staff finds this response acceptable since a standby capsule or additional dosimetry will be available to monitor neutron fluence during the period of extended operation consistent with the guidelines of NUREG-1801 AMP XI.M31, Item 7. For reactor vessels with high lead factors, the standby capsules are recommended by NUREG-1801, AMP XI.M31 to be removed and placed in storage. Therefore, the staff requested the applicant in RAI B2.1.20-1(2) to provide the lead factors for Millstone Unit 3. In addition, the applicant was requested to discuss how capsules with high lead factors are stored to ensure that they are not disposed.

The applicant stated that for Millstone Unit 3, the lead factors for the remaining standby surveillance capsules are approximately 4 (4.11 to 4.32). Therefore, in accordance with the recommendations of NUREG-1801 AMP XI.M31, Item 6, these standby capsules would be removed since further exposure would not provide meaningful metallurgical data. These removed standby capsules will be placed in storage for potential reuse should supplemental information be needed. The applicant also stated that storage of irradiated components in the spent fuel pool is administratively controlled by unit specific procedures. However, the staff notes that currently, there are no detailed guidance regarding the treatment of standby capsules. Therefore, the staff has imposed the following license condition to ensure that any surveillance capsules removed from the Millstone unit, without the intent to test them, are maintained in a condition which would permit their future use, including the period of extended operation, if necessary:

> All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC, as required by 10 CFR Part 50, Appendix H.

The imposition of this license condition is consistent with actions that the staff has taken with other, recent license renewal applicants with respect to the control of “standby” RPV surveillance capsules and reporting requirements.

<u>FSAR Supplement</u>. The applicant’s FSAR supplement summary description for the RVSP is given in Section A2.1.20 and A2.1.19, of Appendix A to the Millstone Units 2 and 3 LRAs, respectively.

This summary description provides an acceptable general description of the RVSPs for Millstone Units 2 and 3. The staff finds that the FSAR supplement for this AMP is acceptable and provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

<u>Conclusion</u>. On the basis of its inspection of the applicant’s program and its review of the information provided by the applicant to address the NUREG-1801 recommendation, the staff finds that the program is consistent with NUREG-1801 and adequately addresses the additional issues as recommended by NUREG-1801.

3.0.3.1.4 Steam Generator Structural Integrity Program

The applicant describes its steam generator structural integrity program (SGSIP) for Units 2 and 3 in LRA Appendix B, Section B2.1.22. The staff reviewed LRA Appendix B, Section

B2.1.22 to determine if the applicant has demonstrated that the program will adequately manage the applicable aging effects in the steam generators (SGs) during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Summary of Technical Information in the Application. The applicant stated that the SGSIP is consistent with the 10 attributes of the program described in GALL AMP XI.M19, "Steam Generator Tube Integrity Program," with no exceptions. In addition, the program scope includes the Units 2 and 3 steam generator tubesheet and cladding. The applicant stated that its program is based on Nuclear Energy Institute (NEI) 97-06 (Steam Generator Program Guidelines) and the associated Electric Power Research Institute (EPRI) guidelines, which provide performance acceptance criteria and guidance for monitoring and maintaining SG tubes. The applicant's program includes performance acceptance criteria for structural integrity, accident-induced and operational leakage, as well as SG integrity and support elements. The program also includes preventive measures to mitigate degradation through control of primary side and secondary side water chemistry; assessment of degradation mechanisms; leakage monitoring; in-service inspection of the SG; and evaluation and plugging, as needed, to ensure the leakage integrity of the pressure boundary. The applicant stated that the tube inspection scope and frequency, tube plugging or repair, and leakage monitoring are in accordance with the Millstone Units 2 and 3 Technical Specifications.

The applicant stated that it currently participates in industry programs whose goals include the investigation of aging effects applicable to nickel-based alloys (i.e., primary water stress corrosion cracking in Alloy 600 base metal and Alloy 82/182 weld metals) and identification of appropriate aging management activities. The applicant commits to implementing the appropriate recommendations that result from this investigation. This commitment is identified in Appendix A, Table A6.0-1 of License Renewal Commitments, Item 14.

The applicant concludes that the SGSIP ensures that the effects of aging associated with the in-scope components will be adequately managed so that there is reasonable assurance that their intended functions will be maintained consistent with the current licensing basis (CLB) throughout the period of extended operation.

Staff Evaluation. The staff reviewed the information included in LRA Appendix B, Section B2.1.22 and the applicant's response to the staff's RAI, dated August 11, 2004, to ensure that the aging effects will be adequately managed so that the intended functions of the SG tubes will be maintained consistent with the CLB throughout the period of extended operation.

The 10 program attributes in the GALL SG Section XI.M19 provide detailed programmatic characteristics and criteria that the staff considers necessary to manage aging effects of the SG tubes and tube plugs. The GALL SG AMP recommends preventive measures to mitigate degradation phenomena; assessment of degradation mechanisms; in-service inspection of SG tubes to detect degradation; evaluation and plugging or repair, as needed, of the SG tubes; and leakage monitoring to ensure the leakage integrity of the pressure boundary. Although the applicant did not describe the program attributes in LRA Section B2.1.22, the applicant has stated that the program attributes are consistent with those stipulated in GALL SG AMP, Section XI.M19, without exceptions nor enhancements.

In addition, the applicant identifies the SGSIP as the AMP to manage the aging effect loss of material in the tubesheet and cladding. Currently, the GALL SG AMP does not address the SG tubesheet and its cladding; therefore, the staff asked the applicant to explain how SGSIP manages aging in those areas. Based on operating experience, cladding has not shown significant degradation. In addition, during routine SG tube inspections, the applicant would inspect the cladding and the tube-end welds as part of the SGSIP. If degradation is identified, the applicant would take appropriate measures to correct the problem. In its response to RAI B2.1.22-2, the applicant stated that although the scope of the GALL SG AMP only addresses the SG tubes, the SGSIP for Millstone Units 2 and 3 additionally addresses the secondary side of the steam generator tubesheet. The staff asked the applicant to discuss how the SGSIP manages the aging effects through the effective incorporation of the following program elements: Preventive Actions, Parameters Monitored/Inspected; Detection of Aging Effects, Monitor and Trending, and Acceptance Criteria. The five elements to manage the aging effects associated with the tubesheet are discussed below.

(1) Preventive Actions: The program includes preventive measures to mitigate degradation through control of primary side and secondary side water chemistry consistent with NEI 97-06 and GALL Section XI.M19. The applicant's SGSIP relies upon secondary systems chemistry control to prevent or mitigate initiation of degradation mechanisms or reduce rates of degradation in the tubesheet. The applicant identified loss of material as the aging effect for the tubesheet. The staff finds that the chemistry control for secondary systems acceptable because it will be effective in preventing or mitigating the secondary side tubesheet degradation.

(2) Parameters Monitored/Inspected: The applicant stated that the SGSIP identified loss of material as the aging effect for the uncladded secondary side of the tubesheet. The applicant will perform an assessment prior to the inspection to predict the expected amount of degradation. The applicant also stated that in addition to tubesheet secondary side inspection, it performs primary side inspections of the tubesheet. Secondary side visual inspections of the tubesheet are performed in accordance with the applicable guidance in NEI 97-06. The applicant's inspection procedures include remote and direct visual examination of the tubesheet's accessible areas for evidence of degradation. The applicant considers factors such as potential degradation mechanisms, industry operating experience and SG design when determining the appropriate inspection requirements. The staff finds that the inspection parameters monitored or inspected are acceptable because the inspection requirements provide reasonable assurance that the SGSIP will monitor the parameters necessary to prevent and mitigate degradation of the secondary side of the tubesheet.

(3) Detection of Aging Effects: The applicant stated that the SGSIP manages the aging effects for the tubesheet prior to the loss of intended function. Visual inspections of the secondary side of the tubesheets are performed in accordance with the guidance identified in NEI 97-06. Typically, the tubesheet in Millstone Unit 2 SGs is inspected every other refueling outage while the tubesheet in the Unit 3 SGs is inspected every outage. The applicant performs a degradation assessment before inspection in which it predicts the expected amount of degradation. Inspection frequencies are based on the results of the degradation assessments and the comparison of such assessments to the as-found inspection results. The applicant may perform visual inspections should the eddy current testing of the tubes indicate the presence of a foreign object. Loose parts or foreign objects are removed from the steam generators unless it can be shown that these objects would not represent any challenge to tube integrity. The staff finds that these are acceptable methods for identifying tubesheet degradation.

(4) Monitoring and Trending: Degradation is managed within the corrective action process to ensure that timely corrective and mitigative actions are performed as necessary. The applicant monitors and trends the tubesheet degradation found through inspections to assure that the intended function is maintained. The staff finds that the applicant's monitoring and trending activities follow GALL AMP Section XI.M19, and therefore, are acceptable.

(5) Acceptance Criteria: The applicant stated that the acceptance criteria for tubesheet secondary side inspections is based on the corrective action process and engineering analysis. Whenever degradation is identified, it is entered into the corrective actions program where an evaluation is performed. Deficiencies that may present a challenge for the component to complete its intended function are promptly corrected or evaluated to be acceptable. If an evaluation is performed without repair or replacement, an engineering analysis is executed to reassure that the intended function is maintained. The staff finds the acceptance criteria acceptable because they follow the GALL AMP Section XI.M19.

Operating Experience. In the fall of 1992, Millstone Unit 2 steam generators were replaced with Babcock and Wilcox steam generators. The pre-service inspection consisted of a 100 percent eddy current examination and it covered the full length of each tube from the hot leg plenum. The applicant did not identify any measurable flaws. During the February 2002 outage, the applicant performed a 100 percent full length bobbin examination of No. 1 SG. The applicant expanded the scope of examination to include locations of special interest tested with a rotating probe. The examinations were performed in the hot and cold leg areas, dings and dents. A visual inspection of the cold leg tubesheet surface of the secondary side revealed a foreign object lodged diagonally between pairs of tubes. The applicant was not successful in retrieving the object. No tubes were plugged in association with this object since no evidence of degradation was observed. The applicant will examine the tubes to verify that there has not been any change to these two tubes in the conditions evaluated.

The Millstone Unit 3 original SGs began commercial operation in the spring of 1986. During the September 2002 outage, the applicant performed a bobbin inspection on approximately 50 percent of the tubes in SGs A and C. The applicant expanded the scope of examination to include +Point™ coil inspections on special interest areas such as the hot leg expansion transitions, low row U-bends, dents and locations where the bobbin response was ambiguous. The inspection results showed seven tubes exhibiting anti-vibration bar wear, two tubes with loose part wear, one tube with an obstruction not allowing the insertion of a probe, and one tube with an single volumetric indication (SVI) and in contact with an adjacent lodged loose part. All of these tubes were preventively plugged. The tube with the lodged loose part had incurred minor damage and was stabilized and plugged. In addition, the applicant performed a 20 percent inspection expansion at top-of-tubesheet locations in both the hot and cold legs of SG A to address the inspection results related to loose part wear. The staff reviewed the annual inspection report and found the SG inspection results consistent with industry experience with similar models of SGs.

During the August 2004, outage, the applicant performed a bobbin inspection on approximately 50 percent of the tubes in SGs B and D in Unit 3. The applicant expanded the scope of the examination to include +Point™ coil inspection on special interest areas such as the hot leg expansion transitions, low row U-bends, dents and locations where the bobbin response was ambiguous. The inspection results showed two tubes with loose part wear, one tube with anti-vibration wear, one tube with a SVI exceeding the plugging limit and a cluster of five tubes identified with SVI signals. Of the cluster of five tubes, three were potentially caused by a loose part. Since the area is not accessible for visual inspection, all of the tubes were plugged and removed from service. One tube in the U-bend region was identified with an SVI. The applicant determined that this indication seems to be a manufacture defect, similar to the tubes plugged prior to startup. This indication was small and not detectable with the bobbin probe. This tube was plugged and removed from service.

No degradation of either the primary side or secondary side of the tubesheets has been identified for Millstone Units 2 and 3. The staff found these SG inspection results consistent with industry experience with similar models of SGs.

<u>FSAR Supplement</u>. The FSAR supplement for the SGSIP is discussed in LRA Appendix A, Sections A2.1.22 and A2.1.21 in the Millstone Unit 2 and Unit 3 LRAs, respectively. The staff verified that the information in the FSAR supplement provides an adequate summary of the program activities, and is consistent with Table 3.1-2 of NUREG-1800. The staff concludes that the information provided in the FSAR supplement for aging management of the steam generators is acceptable because it provides an adequate summary of the program activities, as required by 10 CFR 54.21(d).

<u>Conclusion</u>. On the basis of its review of the applicant's SGSIP and the consistency of this AMP to GALL AMP Section X1.M19, the staff concludes that the applicant has demonstrated that the effects of aging associated with the SGs will be adequately managed by the SGSIP so that the intended functions of the SGs will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate description of the program, as required by 10 CFR 54.21(d).

3.0.3.1.5 Summary of Conclusions for AMPs That Are Consistent With the GALL Report

On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. The staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis (CLB) for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff reviewed the associated FSAR supplements for these AMPs and concludes that the FSAR supplements provide an adequate summary description of the programs, as required by 10 CFR 54.21(d).

3.0.3.2 AMPs that are Consistent with the GALL Report with Exceptions or Enhancements

In Appendix B of the LRA, the applicant indicated that the following AMPs were or will be consistent with the GALL Report with exceptions or enhancements:

- buried pipe inspection program (B2.1.4)
- chemistry control for primary systems program (B2.1.5)
- chemistry control for secondary systems programs (B2.1.6)

- closed-cycle cooling water system (B2.1.7)
- electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.8)
- electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits (B2.1.9)
- fire protection program (B2.1.10)
- flow-accelerated corrosion (B2.1.11)
- fuel oil chemistry (B2.1.12)
- inaccessible medium-voltage cables not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.14)
- inservice inspection program: containment inspections (B2.1.16)
- inservice inspection program: reactor vessel internals (B2.1.17)
- inservice inspection program: systems, components and supports (B2.1.18)
- inspection activities: load handling cranes and devices (B2.1.19)
- service water system (open-cycle cooling) (B2.1.21)
- structures monitoring program (B2.1.23)
- tank inspection program (B2.1.24)
- bolting integrity program (B2.1.26)

For AMPs that the applicant claimed are consistent with the GALL Report with exceptions or enhancements, the staff performed an audit to confirm that those attributes or features of the program for which the applicant claimed consistency with the GALL Report were indeed consistent. The staff also reviewed the exceptions and enhancements to the GALL Report to determine whether they were acceptable and adequate. The results of the staff's audit and reviews are documented in the following sections.

3.0.3.2.1 Buried Pipe Inspection Program

<u>Summary of Technical Information in the Application</u>. The applicant's buried pipe inspection program is described in LRA Section B2.1.4, "Buried Pipe Inspection Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with exceptions and enhancements, with GALL AMPs XI.M28, "Buried Piping and Tanks Surveillance," and XI.M34, "Buried Piping and Tanks Inspection."

The applicant stated in the LRA that the buried pipe inspection program manages the aging effect of loss of material through the use of preventive measures (i.e., coating, wrapping, and cathodic protection) and inspections. Though preventive measures were applied to the external surfaces of the buried piping, no credit was taken for these measures in the determination of the aging effects for the underlying materials. The program evaluates the condition of the coatings and/or wraps as an indication of the condition of the underlying materials.

The applicant also stated in the LRA that the use of impressed-current cathodic protection for in-scope piping is limited to the Unit 2 off-gas pipeway and the Unit 3 supplementary leak collection-and-release system piping.

In addition, the applicant stated that a baseline inspection of the in-scope buried components, located in a damp soil environment, will be performed for a representative sample of each of the following combinations of material and protective measures: Unit 2 - carbon steel/coated, Unit 2 - carbon steel/wrapped, Unit 2 - cast iron/wrapped, Unit 3 - stainless steel/coated, Unit 3 - carbon steel/wrapped, Unit 3 - cast iron/wrapped, and Unit 3 - copper alloy/uncoated.

The program requires that the inspections be completed using available industry guidance such as the National Association of Corrosion Engineers' (NACE) Standard RP-0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems," dated 1996.

Furthermore, the applicant stated that inspections will also be performed when the buried components are excavated for maintenance or for any other reason which will provide an effective method to evaluate the condition of the buried piping and protective coatings on a continuing basis.

<u>Staff Evaluation</u>. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in its MPS audit and review report. Furthermore, the staff reviewed the exceptions and enhancements and their justifications to determine whether the AMP, with the exceptions and enhancements, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.4 of the LRA, the applicant stated that the buried pipe inspection program is consistent with GALL AMPs XI.M28 and XI.M34, with exceptions and enhancements. The buried pipe inspection program takes exception to the "scope of program" program element in that the NACE Standard RP-0169-96, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems," dated 1996, may not have been utilized during initial installation of the piping in establishing the preventive measures, as recommended in the GALL Report.

The staff understands that NACE Standard RP-0169-96 may not have been utilized during installation of the in-scope buried piping. As an enhancement to the program scope, the applicant will perform baseline inspections of the in-scope buried piping located in a damp soil environment to develop a representative sample of each combination of material and protective measures identified in the program description. The inspections will include piping or valves and will provide an effective method for evaluating the condition of the buried components and protective coatings. The inspections will use available industry guidance such as NACE Standard RP-0169-96. With these inspections, the applicant's program for buried piping and valves will meet the intent of the GALL AMP XI.M28 with regard to establishing that the protective measures put in place during construction are effective. Therefore the staff finds this exception to be acceptable.

The buried pipe inspection program also takes exception to the "monitoring and trending" program element in that coating conductance and current requirement for cathodic protection are not trended versus time, as recommended in the GALL Report. Performance parameters of the impressed current cathodic protection systems are checked either monthly or quarterly and compared to predetermined values to verify proper operation.

The staff finds that the difference between trending of cathodic protection versus time and the checking of impressed cathodic protection system current either monthly or quarterly and comparing these values with predetermined values for proper operation is insignificant since aging effects are typically manifested over several years. The staff reviewed the operating experience associated with the buried pipe inspection program and identified no specific instances where degradation had occurred for the buried piping with cathodic protection. Since the verification of performance parameters for the impressed current cathodic protection system ensures proper operation, the intent of the GALL program element is satisfied. The staff concludes that the monthly or quarterly periodicity of checking the cathodic protection system against predetermined values adequately manages the aging effects of buried pipe components during the period of extended operation. The staff finds this exception to be acceptable.

The applicant stated in the LRA that it will enhance the buried pipe inspection program scope of program and detection of aging effects program elements such that a baseline inspection will be performed on a representative sample of different piping materials with different protective measures for the buried piping located in a damp soil environment. The inspections will include a short length of piping and any associated valves for each combination of material and burial condition.

The applicant stated in the LRA that these inspections, using available industry guidance such as NACE Standard RP-0169-96, will provide an effective method to evaluate the condition of the buried piping and protective coatings. With these inspections, the program for buried piping and valves will be consistent with the programs described in GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," with regard to establishing that the protective measures put in place during construction are effective. Components protected by cathodic protection will not be inspected. The staff finds that although the applicant stated that it will perform baseline inspections for in-scope buried piping, it does not specify the type of inspection. The applicant was asked to justify the type of inspection (only visual), or provide other means of detection such as Brinnell hardness, destructive testing, or other mechanical means such as scraping, chipping, etc. By letter dated July 7, 2004, the applicant modified its commitment such that inspection will be performed by visual, and mechanical or other appropriate methods. These inspections will be initiated prior to the period of extended operation. This commitment is identified on the applicant’s license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 3, and in the July 7, 2004, LRA supplement. On the basis that these inspections will cause the applicant’s program to be consistent with GALL AMP XI.M28, the staff finds this enhancement to be acceptable.

The applicant also stated that it will enhance the “scope of program” and “detection of aging effects” program elements for the buried pipe inspection program such that the maintenance and work control procedures will be revised to ensure that inspections of buried components are performed when the piping is excavated during maintenance or for any other reason. These inspections will ensure on a continuing basis that the condition of the buried and protective coating and wrapping remains intact so they will be able to perform their intended function.

The staff identified the following difference regarding the detection of aging effects program element:

> The applicant stated in the discussion of MPS LRA Table 3.3.1, Item 29 that components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and

closed-cycle cooling water systems, and the ultimate heat sink, are subject to loss of material due to selective leaching. Management of this aging effect is assigned to the work control process and buried pipe inspection program.

GALL AMP XI.M.33, “Selective Leaching of Materials,” recommends a combination of one-time inspection and hardness measurement. Since selective leaching is a slow acting corrosion process, it is recommended that this be performed as late in the plant life as possible, preferably after 30 years of service.

Selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection. Hence, a Brinnell hardness test on the inside surfaces of a selected set of components is recommended to determine if selective leaching has occurred. Alternatively, if a component is removed from service for whatever reason, a destructive test could be performed.

As documented in the staff’s MPS audit and review report for the in the buried piping inspection program, the applicant will revise its maintenance and work control procedures to ensure that inspections of buried components are performed when the piping is excavated during maintenance or for any other reason. The applicant stated, in the LRA, that these inspections will ensure on a continuing basis that the condition of the buried and protective coating and wrapping remain intact so they will be able to perform their intended function. With these inspections, the applicant’s program for buried piping will be consistent with GALL AMP XI.M34, “Buried Piping and Tanks Inspection.” This commitment is identified on the applicant’s license renewal commitment list in the MPS LRA, Appendix A, Table A6.0-1, as Item 4, and the July 7, 2004, LRA supplement. On the basis that these inspections will cause the applicant’s program to be consistent with the GALL AMP XI.M34, the staff finds this enhancement to be acceptable.

Operating Experience. The staff reviewed operating experience for the applicant’s buried pipe inspection program. The review indicated the buried pipe inspection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. The following examples, based on review of condition reports generated under the corrective action program, are representative of internal operating experience at MPS and were considered for evaluating the effectiveness of the program.

During performance of cathodic protection system maintenance on rectifiers, the applicant noted that one of its anodes had a low reading. As a result, a work order was developed to perform excavation as required to facilitate the replacement of the anode. Contingency plans were made to replace additional anodes in system if it was discovered that the affected node had been sacrificed. Subsequently, cathodic protection vendor representatives visited the site and performed a walkdown of the off-gas cathodic protection system. Further evaluations and discussions with the applicant’s technical personnel included review of photographs of the anodes that were recently replaced and a briefing on the recent history of the system. Agreement was reached that a wholesale replacement of all the anodes in the system was not warranted based on the condition of the affected anode.

The applicant stated in the LRA that corrosion mechanisms seen in the firewater piping are similar to those seen in the domestic water (city water) piping. These mechanisms are well known and do not require sampling to determine their cause or extent. Additionally, the fire water system is flow-tested every three years, and no significant degradation in overall loop flow has been noted. Further, due to the recent decommissioning of Unit 1, several parts of the site's firewater above ground piping have been removed and made available for detailed inspection.

All of the Unit 1 piping segments had been in place and filled with water for approximately 30 years. No significant corrosion was identified in the above ground piping. While one piece of unlined 6-inch carbon steel pipe had about ¼-inch of corrosion buildup, this buildup was evaluated and determined to not restrict flow nor challenge the system's pressure boundary.

The rest of the aboveground piping segments inspected were clean. Since the fire pumps are run frequently, the piping associated with the pumps' suction lines and tank recirculation lines was considered subject to corrosion buildup. During the fire tank replacement project, segments of the firewater suction piping and tank recirculation piping were disassembled and inspected. When disassembled, these lines were observed to have a significant corrosion buildup, but this corrosion buildup did not affect pump performance, which was measured using lines that frequently experienced flow. Much of this corroded piping, and the tanks themselves, were replaced as part of the fire tank replacement project.

On the basis of its review of the above operating experience, the staff concludes that the buried pipe inspection program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.4 of the MPS Unit 2 LRA and Appendix A, Section A2.1.3 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the buried pipe inspection program, as supplement by the July 7, 2004, letter. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement and the July 7, 2004, letter sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.2 Chemistry Control for Primary Systems Program

Summary of Technical Information in the Application. The applicant's chemistry control for primary systems program is described in LRA Section B2.1.5, "Chemistry Control for Primary Systems Program." In the LRA, the applicant stated that this is an existing MPS program. This program is consistent, with an exception, with GALL AMP XI.M2, "Water Chemistry."

The applicant stated in the program basis document that the chemistry control for primary systems program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides, dissolved oxygen, and sulfate concentration below the levels known to result in loss of material or cracking in accordance with the Electric Power Research Institute (EPRI) Technical Report TR-105714, "PWR Primary Water Chemistry Guidelines," Revision 4, dated March 1999.

The applicant also stated in the program basis document that the chemistry control for primary systems program monitors the fluids within the following systems and components: reactor coolant system, emergency core cooling system (refueling water storage tank and safety injection accumulator tanks), chemical and volume control system (boric acid storage tank, letdown demineralizer (Unit 2), and volume control tank (Unit 2)), spent fuel pool cooling and purification system (spent fuel pool demineralizer), sampling system, primary makeup water (primary water storage tank (Unit 2), primary grade water storage tank (Unit 3), and demineralized water storage tank (Unit 3)).

The applicant stated in the program basis document that the monitored chemistry parameters are based on information provided in EPRI TR-105714 and the requirements of the plant technical specifications and the plant technical requirements manual. The monitored parameters include the following items: chlorides, conductivity, dissolved oxygen, fluorides, hydrogen, hydrogen peroxide, lithium, pH, and sulfates. In addition, the applicant stated in the LRA that verification of the effectiveness of the chemistry control for primary systems program is provided by the work control process.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and its justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.5 of the LRA, the applicant stated that the chemistry control for primary systems program is consistent with GALL AMP XI.M2, with an exception. The chemistry control for primary systems program takes exception to the "scope of program" program element in that the applicant's program is based on Revision 4 of EPRI guideline TR-105714 (the applicable EPRI guideline for the primary water chemistry systems program), rather than Revision 3 or a later revision approved by the NRC, as recommended by the GALL Report. Revision 4 of EPRI TR-105714 has not yet been approved by the NRC.

The later revision of the EPRI guideline incorporates additional industry operating experience not available at the time of the issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of primary chemistry parameters. On the basis that the later revision of the EPRI guidance applies more stringent guidelines than the earlier version, the staff finds this exception to be acceptable.

Operating Experience. The applicant stated in the program basis documents that the chemistry control for primary systems program is based on the EPRI guidelines to take advantage of industry operating experience as is done in the GALL Report. The staff reviewed condition reports and interviewed the applicant's technical staff, which did not reveal any examples where the loss of intended function occurred as the result of inadequate primary water chemistry controls. The staff determined that the operating experience indicates that the chemistry control for primary systems program creates an environment that minimizes material degradation. The staff's review of the applicant's operating experience indicates that primary water systems chemistry parameters can drift from their acceptable ranges, but the chemistry control for primary systems program is effective in identifying these anomalies, implementing effective corrective action, and trending the parameters. When chemistry results reach a level at which loss of material or cracking could become a concern related to the loss of intended function, immediate corrective actions have been implemented to preclude the necessity for a plant shutdown.

On the basis of its review of the above operating experience, the staff concludes that the chemistry control for primary systems program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A.2.1.5 of the MPS Unit 2 LRA and Appendix A, Section A2.1.4 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the chemistry control for primary systems program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.3 Chemistry Control for Secondary Systems Program

Summary of Technical Information in the Application. The applicant's chemistry control for secondary systems program is described in LRA Section B2.1.6, "Chemistry Control for Secondary Systems Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an exception, with GALL AMP XI.M2, "Water Chemistry."

The applicant stated in the LRA that this program includes periodic monitoring and control of known detrimental contaminants such as chlorides, sodium, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking in accordance with EPRI Technical Report TR-102134, "PWR Secondary Water Chemistry Guidelines," Revision 5, dated May 3, 2000.

As documented in the staff's MPS audit and review report for the chemistry control for secondary systems program, the applicant stated that the chemistry control for secondary systems program ensures that the effects of aging are managed for the main steam, feedwater, and auxiliary feedwater systems, as well as the following plant-specific systems: for MPS Unit 2, sampling, moisture separation and re-heat, condensate, condensate storage and transfer, feedwater heater vents and drains, plant heating and condensate recovery, secondary chemical addition, extraction steam, turbine gland sealing steam, and condensate demineralizer mixed bed system; for MPS Unit 3, auxiliary steam, auxiliary boiler condensate and feedwater, reactor plant sampling, steam generator blowdown, and condensate make-up and draw-off systems.

The applicant also stated, as documented in the staff's MPS audit and review report for the chemistry control for secondary systems program, that in accordance with EPRI TR-102134, Revision 5, dated May 3, 2000, the monitored parameters include cation conductivity, chloride, copper, dissolved oxygen, hydrazine, iron, lead, pH, sodium, specific conductivity, and sulfate.

Additionally, the applicant stated, as documented in the staff's MPS audit and review report for the chemistry control for secondary systems program, that verification of the effectiveness of the secondary systems water chemistry program is provided by the work control process, which provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process involves a sufficient number of components such that it provides an ongoing representative indication of the integrity of components affected by the chemistry control tasks.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and its justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.6 of the LRA, the applicant stated that the chemistry control for secondary systems program is consistent with GALL AMP XI.M2, with an exception. The chemistry control for secondary systems program takes exception to the "scope of program" element in that the applicant's program is based on Revision 5 of EPRI guideline EPRI TR-102134 (the applicable EPRI guideline for the secondary water chemistry systems program), rather than Revision 3 or a later revision approved by the staff, as recommended by the GALL Report. Revision 5 of EPRI TR-102134 has not yet been approved by the staff.

The later revision of the EPRI guideline incorporates additional industry operating experience not available at the time of the issuance of the earlier revision and is in keeping with the latest industry practice. Further, the later revision is more conservative with regard to monitoring and control of secondary chemistry parameters. On the basis that the later revision of the EPRI guidance applies more stringent guidelines than the earlier version, the staff finds this exception to be acceptable.

Operating Experience. The applicant stated in the program basis documents that the chemistry control for secondary systems program is based on the EPRI guidelines to take advantage of industry operating experience as is done in the GALL Report. The staff reviewed condition reports and interviewed the applicant's technical staff, which did not reveal any examples where the loss of intended function occurred as the result of inadequate secondary systems water chemistry controls. The staff determined that the operating experience indicates that the chemistry control for secondary systems program creates an environment that minimizes material degradation. The staff's review of the applicant's operating experience indicates that chemistry parameters can drift from their acceptable range, but the chemistry control for secondary systems program is effective in identifying these anomalies, implementing corrective action, and trending the parameters. When chemistry results reach a level at which loss of material or cracking could become a concern (i.e., potentially affect the intended function), plant power reductions are implemented until corrective actions are completed.

On the basis of its review of the above operating experience, the staff concludes that the chemistry control for secondary systems program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.6 of the MPS Unit 2 LRA and Appendix A, Section A2.1.5 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the chemistry control for secondary systems program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.4 Closed-Cycle Cooling Water System

Summary of Technical Information in the Application. The applicant's closed-cycle cooling water system program is described in LRA Section B2.1.7, "Closed-Cycle Cooling Water System." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with an exception, with GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems." Also, in an LRA supplement letter dated July 7, 2004, the applicant added an enhancement to its closed-cycle cooling water system program.

The applicant stated in the LRA that the closed-cycle cooling water (CCCW) system program manages the effects of loss of material through maintenance of process fluid chemistry and performance monitoring of CCCW systems to ensure parameters remain within acceptable limits. The program is based on guidance contained in EPRI Technical Report TR-107396, "Closed Cooling Water Chemistry Guidelines," dated November1997.

The applicant stated, as documented in the staff's MPS audit and review report for the closed-cycle cooling water system program, that the CCCW system program monitors fluids and components within the following in-scope systems: for Unit 2 - chilled water, reactor building, closed cooling water, emergency diesel generator (jacket cooling water) systems; and for Unit 3 - reactor plant component cooling water, emergency diesel generator (jacket cooling water), control building chilled water, safety injection pumps cooling, and charging pumps cooling system.

Additionally, the applicant stated, as documented in the staff's MPS audit and review report for the closed-cycle cooling water system program, that the CCCW system program monitors only the CCCW side of the heat exchangers that are within the scope of license renewal. The service water system (open-cycle cooling) program monitors the service water side of the heat exchangers.

The applicant also stated, as documented in the staff's MPS audit and review report for the closed-cycle cooling water system, that the parameters that are currently monitored by the CCCW system program are in accordance with the closed cooling water system chemistry control procedure and EPRI TR-107396. The following parameters are monitored or used as a diagnostic tool as part of this program: adenosine triphosphate, ammonia, chloride, conductivity, copper, dissolved oxygen, fluoride, Freon, gross activity, hydrazine, iron, LCS-60 (as nitrogen dioxide), LCS-1200 (as molybdenum), pH, tolyltriazole, total organic carbon, and total petroleum.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation of this AMP are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and enhancement and their justifications to determine whether the AMP, with the exception and enhancement, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.7 of the LRA and the LRA supplemental letter dated, July 7, 2004, the applicant stated that the closed-cycle cooling water system program is consistent with GALL AMP XI.M21, with an exception and enhancement. The closed-cycle cooling water system program takes exception to the "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements in that this program does not include performance testing of the CCCW side of heat exchangers.

For the "parameters monitored/inspected" program element associated with the exception taken by the applicant, the GALL Report states that the AMP monitors the effects of corrosion by surveillance testing and inspection in accordance with standards in EPRI TR-107396 to evaluate system and component performance. For pumps, the "parameters monitored/inspected" include flow and discharge and suction pressures. For heat exchangers, the "parameters monitored/inspected" include flow, inlet and outlet temperatures, and differential pressure.

The applicant stated, in the LRA, that the parameters recommended in the GALL Report for a heat exchanger are not specifically monitored by the CCCW program to indicate corrosion buildup. Instead, the CCCW program relies on the use of corrosion inhibitors to minimize and to maintain heat exchanger performance. The applicant also stated, as documented in the staff's MPS audit and review report for the CCCW system program, that the heat exchangers for the CCCW system use service water as the cooling medium and are monitored, inspected, and trended on the service side by the service water program, as described in the service water system (open-cycle cooling) program. The staff has approved, in GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989, the performance of regular, frequent cleaning of the service water side in lieu of thermal performance testing.

The applicant added, as documented in the staff's MPS audit and review report for the CCCW system program, that MPS maintains low corrosion rates on the closed-cycle cooling water side by using corrosion inhibitors. Operating experience indicates that the corrosion of the CCCW side of the heat exchangers is not a concern. Inspections of the internal piping surfaces, performed by the applicant during normal maintenance activities, indicate that corrosion was not occurring. Volumetric inspections of piping, and eddy current testing and visual inspections of heat exchanger tubes also showed no signs of corrosion activity. Performance testing of the CCCW side of heat exchangers is not performed at MPS.

For the “detection of aging effects” program element associated with the exception taken by the applicant, the GALL Report states that control of water chemistry does not preclude corrosion at locations of stagnant flow conditions or crevices. Degradation of a component due to corrosion would result in degradation of system or component performance. The extent and schedule of inspections and testing in accordance with EPRI TR-107396 assure detection of corrosion before the loss of intended function of the component. Performance and functional testing in accordance with EPRI TR-107396, ensures acceptable functioning of the CCCW system or components serviced by the CCCW system. For systems and components in continuous operation, performance adequacy is determined by monitoring data trends for evaluation of heat transfer fouling, pump wear characteristics, and branch flow changes. Components not in operation are periodically tested to ensure operability.

The applicant stated in the LRA, that thermal performance testing of the closed-cycle cooling heat exchangers is not performed, so the parameters specified in GALL AMP XI.M21 are not periodically monitored. The CCCW system program eliminates the need for this monitoring by the use of corrosion inhibitors.

The applicant also stated, as documented in the staff’s MPS audit and review report for the CCCW system program, that the CCCW system program includes both aging effect mitigation activities (chemistry control) and performance monitoring activities, neither of which directly detects aging effects. The identification of out-of-specification water chemistry conditions or declining component performance indicates the potential for component degradation. The applicant added that monitoring the chemistry of the in-scope CCCW system is generally performed weekly with additional testing performed monthly and/or quarterly. Performance testing of the in-scope pumps is performed quarterly as part of the inservice testing program or diesel engine surveillance. Performance testing of the CCCW side of the heat exchangers is not performed at MPS.

For the “monitoring and trending” program element associated with the exception taken by the applicant, the GALL Report states that the frequency of sampling water chemistry varies and can occur on a continuous, daily, weekly, or as needed basis, as indicated by plant operating conditions. Per EPRI TR-107396, performance and functional tests are performed at least every 18 months to demonstrate system operability, and tests to evaluate heat removal capability of the system and degradation of system components are performed every five years. The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.

The applicant stated in the LRA that periodic performance tests are not performed for CCCW system heat exchangers. As a result, monitoring of heat exchanger flow, inlet and outlet temperatures, and differential pressure is not performed and this data is not trended. The CCCW system program relies on the use of corrosion inhibitors to minimize the effects of corrosion and to maintain heat exchanger performance, eliminating the need for periodic performance testing.

The applicant stated, as documented in the staff’s MPS audit and review report for the closed-cycle cooling water system program, that water chemistry parameters are monitored and the results are trended to provide timely indication of abnormal chemistry conditions. Chemistry supervisors and control room personnel are notified and determine the need for additional sampling, analysis, and corrective actions when the established limits are exceeded. If out-of-specification parameters are deemed to promote accelerated corrosion or produce a component or system failure, a condition report is initiated in accordance with the corrective action program. Trending of chemistry data provides a basis for confirming that sampling frequencies are appropriately set to continue the effective monitoring of chemistry trends. Component performance is also monitored and trended to detect potential degradation before any loss of intended function. If monitored parameters are outside proceduralized ranges or values, chemistry supervisors and control room personnel are notified and a condition report is initiated in accordance with the corrective action program.

During the audit and review, the staff noticed a footnote in the monitoring and trending section of the closed-cycle cooling water system program, as documented in the staff's MPS audit and review report, which stated that, heat exchangers cooled by service water are performance monitored, inspected, and trended on the service water side as part of the service water system program. The staff reviewed the service water system (open-cycle cooling) program, as documented in the staff's MPS audit and review report, and found that performance testing is done on only some heat exchangers, while the above footnote implies that performance testing is done on all heat exchangers. The staff requested that the applicant provide clarification for this footnote. The applicant concurred with the staff that there was an error in the above mentioned footnote. The applicant revised the footnote to read, "Not all the CCCW heat exchangers. . ." The staff reviewed the applicant response, as documented in the staff's MPS audit and review report, and concludes that concerns related to the footnote in the CCCW are resolved.

In addition, during the audit, the staff asked the applicant to explain how performance of the heat exchangers will be monitored and trended since the applicant is taking an exception to the heat exchanger performance monitoring approach, as recommended by GALL AMP XI.M21. In its response during the audit, the applicant presented a pump summary report for Unit 3 for the period of January 1, 1999 through April 1, 2004; and a pump summary report for Unit 2 for the period of January 1, 1999 through March 31, 2004. During the audit, the staff reviewed the data and found that no degradation was identified. The staff finds the pump data to be acceptable as documented in the audit and review report.

For the "acceptance criteria" program element associated with the exception taken by the applicant, the GALL Report states that corrosion inhibitor concentrations are maintained within the limits specified in the EPRI water chemistry guidelines for CCCW. System and component performance test results are evaluated in accordance with the guidelines of EPRI TR-107396. Acceptance criteria and tolerances are also based on system design parameters and functions.

The applicant stated in the LRA that periodic performance testing of CCCW system heat exchangers is not performed. Therefore, the analysis and trending of system and component performance test results described in GALL AMP XI.M21 cannot be performed. The applicant also stated that lack of negative operating experience indicates that this is acceptable.

Additionally, the applicant stated, as documented in the staff's MPS audit and review report for the closed-cycle cooling water system program, that the acceptance criteria reflect EPRI guidelines for parameters in the CCCW systems that have been shown to contribute to component degradation. Adherence to the guidelines minimizes loss of material and detects potential component degradation before the loss of intended function occurs. The applicant stated that system and component performance test results are evaluated in accordance with procedural requirements that meet or exceed EPRI guideline requirements.

During the audit and review, the staff noted that there was not sufficient information available to provide a basis for accepting the applicant's exception as stated in the AMP for the CCCW system program. In subsequent discussions with the staff, the applicant proposed the addition of an enhancement to the CCCW system program and documented the enhancement in an LRA supplement letter dated July 7, 2004. The applicant committed, in the LRA supplement letter, that baseline inspections of the CCCW side of a sample of closed-cycle cooling heat exchangers will be performed to verify that the corrosion control program is acceptable and heat exchangers performance is maintained.

On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection, as described in the enhancement to the CCCW system program, the staff finds the exception to be acceptable. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 29 for MPS Unit 2 and Item 30 for MPS Unit 3. The enhancements are described in detail below.

The applicant stated in an LRA supplement letter dated July 7, 2004, that it will enhance the CCCW system program "parameters monitored/inspected," "detection of aging effects," and "monitoring and trending" program elements by performing a baseline visual inspection of the accessible areas of the heat exchanger shell side of a sample of CCCW heat exchangers prior to the period of extended operation. The inspection will verify that the chemistry control portion of the closed-cycle cooling water system program is adequately maintaining the corrosion control of the closed-cycle cooling heat exchangers.

The applicant stated that the parameters recommended by the GALL Report to be monitored for a heat exchanger are not specifically monitored by the CCCW system program for corrosion buildup indication. The applicant stated, in the LRA supplement letter dated July 7, 2004, that instead, baseline inspections of the CCCW side of a sample of closed-cycle cooling heat exchangers will be performed to verify that the corrosion control program is acceptable and that the heat exchanger performance is maintained. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection, described in the LRA supplement letter for the CCCW system program, the staff finds the enhancement to be acceptable. The staff finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The applicant stated in the LRA that thermal performance testing of the closed-cycle cooling heat exchangers is not performed on most heat exchangers. Instead, the applicant stated, in its LRA supplement letter dated July 7, 2004, that baseline inspections of the CCW side of a sample of closed-cycle cooling heat exchangers will be performed to verify that the corrosion control program is acceptable, heat transfer fouling is not occurring, and heat removal capability is maintained. On the basis of its review of the CCCW heat exchanger operating data and the additional commitment to perform the inspection, described in the LRA supplement letter for the CCCW system program, the staff finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

Operating Experience. The staff reviewed operating experience for the applicant's CCCW system program. The applicant stated in the LRA that operating experience indicates that chemistry parameters and component performance can drift from their acceptable ranges, but that the CCCW system program is effective in identifying these anomalies, implementing corrective action, and trending the parameters. The applicant also stated that when chemistry results reach a predetermined level, corrective actions are properly completed to return the parameter to within acceptable limits, or compensatory measures are implemented. Similarly, supervisors and control room personnel are notified when component performance falls outside proceduralized ranges or values, and a condition report is initiated in accordance with the corrective action program. During discussions with the staff, the applicant's technical staff indicated that, to the best of its knowledge, there has not been a loss of intended function for the components managed by the CCCW system program.

On the basis of its review of the above operating experience, the staff concludes that the CCCW system program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.7 of the MPS Unit 2 LRA and Appendix A, Section A2.1.6 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the CCCW system program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.5 Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Technical Information in the Application. The applicant's program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements is described in LRA Section B2.1.8, "Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." In the LRA, the applicant stated that this is a new program that will be established prior to the period of extended operation. This commitment is identified on the applicant's license renewal commitment list in the MPS Units 2 and 3 LRAs, Appendix A, Table A6.0-1, as Item 5. This program will be consistent, with an enhancement, with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

The applicant stated in the LRA that this program will include electrical cables and connections within the scope of license renewal that are exposed to an adverse localized environment but are not subject to the EQ requirements of 10 CFR 50.49. Connection types within the scope of the program include connectors, fuse holders, splices, and terminal blocks. Fuse holders (including fuse clips and fuse blocks) are included consistent with Interim Staff Guidance (ISG)-5, “Identification and Treatment of Electrical Fuse Holders for License Renewal,” dated March 10, 2003. Adverse local environments include heat, radiation, or moisture local to the cables or connections. The applicant also stated in the LRA that this program will manage the aging effects of cracking and embrittlement to ensure that the cables and connections within the scope of the program are capable of performing their intended function. The program will sample and inspect cables and connections from accessible areas having an adverse localized environment, in a manner intended to also represent, with reasonable assurance, cables and connectors in inaccessible areas with an adverse localized environment.

The applicant stated in the LRA that the inspection plans will be developed consistent with GALL AMP XI.E1 and considering the technical information and guidance contained in EPRI Technical Report TR-109619, “Guideline for the Management of Adverse Localized Equipment Environments,” dated June 1999, IEEE Standard P1205-2000, “IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations,” NUREG/CR-5643, “Insights Gained from Aging Research,” dated March 1992, and SAND96-0344, “Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations,” dated September 1996. This program will use a sampling methodology based on a recognized industry or military standard.

Staff Evaluation. During its audit and review, the staff confirmed the applicant’s claim of consistency with the GALL Report. Details of the staff’s audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the enhancement and its justification to determine whether the AMP, with the enhancement, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.8 of the LRA, the applicant stated that the program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements will be consistent with GALL AMP XI.E1, with an enhancement. The applicant stated that it will enhance the “detection of aging effects” program element such that initial visual inspections for representative samples of accessible non-EQ insulated cables and connections will be performed and applicable fuse holders will be tested between year 30 and the end of the current operating license. Subsequent confirmation of ambient conditions and fuse holder testing will be performed at least once every 10 years during the period of extended operation.

For the “Detection of the Aging Effects” program element associated with the enhancement by the applicant, the GALL Report states that conductor insulation aging degradation from heat, radiation, or moisture in the presence of oxygen causes cable and connection jacket surface anomalies. Accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years. This is an adequate period to preclude failures of the conductor insulation since experience has shown that aging degradation is a slow process. A 10-year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first inspection for license renewal is to be completed before the period of extended operation.

In a letter dated March 10, 2003, (ML030690512), the NRC forwarded to the Nuclear Energy Institute (NEI) and Union of Concerned Scientists interim staff guidance (ISG)-5 for the identification and treatment of electrical fuse holders for license renewal. In ISG-5, the staff indicated that fuse holders should be scoped, screened, and included in the AMR in the same manner as terminal blocks and other types of electrical connections that are currently being treated in the process. Further, this applies to fuse holders that are not part of a larger assembly such as switchgear, power supplies, power inverters, battery chargers, circuit boards, etc. Fuse holders in these types of active components would be considered to be piece parts of the larger assembly and not subject to an AMR.

Operating experience, as discussed in NUREG-1760, "Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants," identified that aging stressors such as vibration, thermal cycling, electrical transients, mechanical stress, fatigue, corrosion, chemical contamination, or oxidation of the connections surfaces can result in fuse holder failure. Visual inspection alone may not be sufficient to detect the aging effects from fatigue, mechanical stress, vibration, or corrosion of the metallic clamps of the fuse holders. Other methods of aging detection may be necessary.

The applicant, in MPS LRA Table A6.0-1, License Renewal Commitments, Commitment Number 6, committed to evaluate external fuse holders before the beginning of the extended period of operation for possible aging effects. The staff reviewed the applicant's commitment and finds that evaluation of the external fuse holders before the beginning of the extended period of operation is not consistent with the staff's position as described in ISG-5. Also, in the LRA, the applicant credits the program for the electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements as the applicable AMP. The staff reviewed the program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements and finds that, with respect to fuse holders, this AMP only addresses the aging effects of insulation portions of fuse holders and that it does not address the aging effects from fatigue, mechanical stress, or vibration on the metallic portions of fuse holders. During the audit, the staff requested that the applicant provide an aging management program to address the metallic portion of fuse holders or provide justification as to why an AMP is not required.

By letter dated February 15, 2005, the applicant provided its response. In its response, the applicant stated that a scoping and screening review had been performed to identify fuse holders that meet the requirements as delineated in ISG-5. For Millstone Units 2 and 3, the review identified fuse holders that are not a part of a larger active assembly and that support intended functions under 10 CFR 54.4(a)(1) and (a)(2), and therefore are subject to aging management review. The aging management review performed for these fuse holders concluded that there are no aging effects that require management. The applicant, in its response, provided the following information which describes the scoping and screening process and the aging management review performed for fuse holders:

> Scoping and Screening Process - Millstone Units 2 and 3 fuse holders were identified through plant walkdowns and a review of the Millstone master equipment list, electrical drawings, and electrical specifications. Fuse holders that were located within larger active assemblies were subsequently eliminated from further consideration with respect to the requirements of ISG-5. Active components were determined based on the guidance contained in NUREG-1800.
>
> The fuse holders installed in safety related (SR) fuse panels were included in scope in accordance with 10 CFR 54.4(a)(1) and were determined to be subject to aging management review. Of the remaining fuse holders, a number of non-safety related fuse holders that do not perform an intended function in accordance with 10 CFR 54.4(a)(2) were identified based on an electrical circuit review and were not included in the scope

of license renewal. The remaining non-safety related fuse holders were included in scope and subject to aging management review.

Aging Management Review - An aging management review has been performed for the fuse holders identified above (including both the insulation material and the metallic clips). The fuse holders that are subject to aging management review are associated with low-voltage circuits and are mounted on fuse panels that are installed in gasketed enclosures located indoors.

ISG-5 states that an aging management program would be required for the aging stressors of fatigue, mechanical stress, vibration, chemical contamination, and corrosion, if these stressors are applicable for fuse holders subject to aging management review.

The non-metallic insulation material of the fuse holders was previously evaluated and found to have no aging effects requiring management. The insulation material is identified in LRA Table 3.6.2-1 as the Insulation commodity group with Inorganic Materials as the material and “air” as the environment.

The aging stressors identified in ISG-5 have been evaluated for fuse holder metallic clips and the following is a summary of the four aging management review results.

(1) Fatigue - NUREG-1760, “Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants,” states that fatigue of fuse holders can typically occur due to elevated temperature, mechanical stress, and repeated insertion and removal of fuses. NUREG-1760 further states that fuse failures resulting from thermal cycling are associated with the fuse element, and not the fuse holder.

    The fuse holders requiring aging management review are located indoors in a mild environment. There are no significant sources of heat in close proximity to the fuse holders such that elevated temperatures are not expected. Therefore, fatigue due to elevated temperature was determined not to require management for these fuse holders.

    Fatigue related to mechanical stress and/or repeated insertion and removal is evaluated under Mechanical Stress.

(2) Mechanical Stress - For the fuse holders subject to aging management review, the fuses are not routinely removed and reinserted into the fuse clips. With the exception of one panel of fuse holders, the fuse holders are comprised of a block assembly of two or three fuses (i.e., two or three sets of fuse clips on a removable block). The removable block assembly permits interruption of the circuit for testing or isolation without removal of the fuses from the fuse holder metallic clips. The block assembly fuses are only removed from the fuse clips during fuse replacement. For the other panel, the fuse holders are the typical base insulating material with attached fuse clips. The fuses for this configuration are also only removed during fuse replacement with circuit isolation performed by other

devices in the circuit. Therefore, these fuse clips are not subject to repeated manipulation, which could lead to mechanical fatigue.

Mechanical stress resulting from electrical faults and transients is not considered a credible aging mechanism since electrical faults are infrequent and random in nature. Stresses resulting from electrical faults and transients are mitigated by fast acting circuit protective devices. Therefore, no aging management is required for mechanical stress.

(3) Vibration - The fuse holders subject to aging management review are located in fuse panels. These panels are not mounted on rotating equipment or in close enough proximity to rotating equipment to be affected by vibration. Therefore, no aging effects related to vibration require management.

(4) Chemical Contamination/Corrosion - The fuse panels containing fuse holders that are subject to aging management review consist of gasketed enclosures that are located indoors. The fuse holders are not subject to moisture or chemicals inside the panel enclosures that would provide a corrosive environment. Therefore, chemical contamination and corrosion do not require management for the fuse holders.

The results of the aging management review are summarized in the LRA supplemental tables 3.6.2-1a for Unit 2 and Unit 3. The aging management review for fuse holders concludes that there are no aging effects that require management. These aging management review results are supported by a Millstone operating experience review which did not identify any instances of fuse holder age related degradation.

As a result of this review of fuse holders, the commitment described in LRA Table A6.0-1, Item 6 is completed.

In ISG-5, the staff indicates that the AMR for fuse holders (metallic clamps) needs to include the following stressors, if applicable: fatigue, mechanical stress, vibration, chemical contamination, and corrosion. Where environments or operating conditions preclude such aging effects (e.g., fuse holders not subject to vibration from rotating machinery), they need not be addressed by the AMP. For the fuse holders subject to aging management review at Millstone Units 2 and 3, the fuses are not routinely removed and reinserted into the fuse clips. With the exception of one panel of fuse holders, these fuse holders are comprised of a block assembly of two or three fuses (i.e., two or three sets of fuse clips on a removable block). The removable block assembly permits interruption of the circuit for testing or isolation without removal of the fuses from the fuse holder metallic clips. The block assembly fuses are only removed from the fuse clips during fuse replacement. For the other panel, the fuse holders are the typical base insulating material with attached fuse clips. The fuses for this configuration are also only removed during fuse replacement with circuit isolation performed by other devices in the circuit. Therefore, these fuse clips are not subject to repeated manipulation, which could lead to mechanical fatigue. For other aging effects identified in ISG-5, the staff reviewed the applicant's response and determined that the applicant provided adequate technical justification of why an AMP for the metallic portions of these fuse holders is not required. On the basis of its review, the staff finds that applicant's response adequately addresses each aging effects identified in ISG-5, and therefore, finds the applicant's response acceptable.

Operating Experience. The staff reviewed operating experience for the applicant's program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements. The applicant stated in the LRA that electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements is a new program for which there is no operating experience. The operating experience data associated with implementing this program will be addressed in the applicant's corrective action program.

During the audit, in discussions with the staff, the applicant stated that its review of prior operating experience found that no significant non-EQ cable jacket or fuse holder anomalies have been identified that can be attributed to age-related degradation. As a part of the documentation supporting this program, the applicant screened and compiled condition reports involving cable or connection degradation for Units 2 and 3. The staff reviewed a sample of these condition report summaries, compiled by the applicant, and found the evaluation and disposition of the various conditions as reported therein to be consistent with that conclusion.

On the basis of its review of the above operating experience, the staff concludes that the applicant's program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements adequately manages the aging effects that have been observed at the applicant's plant.

FSAR supplement. In Appendix A, Section A2.1.8 of the MPS Unit 2 LRA, Appendix A, Section A2.1.7 of the MPS Unit 3 LRA, and subsequent LRA supplements, the applicant provided the FSAR supplement for the applicant's program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.6 Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

Summary of Technical Information in the Application. The applicant's program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits is described in LRA Section B2.1.9, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an enhancement, with GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits."

The applicant stated in the LRA that the program includes instrumentation cable and connectors used in circuits with sensitive low-level signals (such as nuclear instrumentation and radiation monitoring), within the scope of license renewal, that are exposed to an adverse localized environment but are not subject to the EQ requirements of 10 CFR 50.49. Adverse local environments include heat, radiation, or moisture local to the cables or connectors. The program manages the aging effects of cracking and embrittlement to ensure that the cables and connectors within the scope of the program are capable of performing their intended functions. For cables within the scope of this program that are energized during calibration of the associated instrumentation, the program relies on in-situ calibration data and results from surveillance required by technical specifications for the instrumentation. Surveillance of this type includes channel calibrations, channel functional testing, and channel checks. For these sensitive, low-level signal channels, the applicant expects to detect reduced insulation resistance during calibration. In addition, troubleshooting of these instrumentation channels includes visual inspection of cables and connections.

The applicant stated in the LRA that for instrument channels within the scope of this program where the applicant does not perform in-situ calibration, such as for certain area radiation monitors, the applicant will monitor cable degradation by an alternate method that tests the cable. The applicant stated in its license renewal project position paper for in-scope non-environmentally qualified instrumentation circuits with sensitive low-level signals, that appropriate tests would be used to determine the cable insulation condition, such as insulation resistance tests or time domain reflectometry. The test program will be developed using the guidance cited in GALL AMP XI.E2 and articulated in EPRI TR-109619, IEEE Std 1205-2000, NUREG/CR-5643, and SAND96-0344.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the enhancement and justification to determine whether the AMP, with the enhancement, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.9 of the LRA, the applicant stated that its program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits will be consistent with GALL AMP XI.E2 with an enhancement. The applicant stated that it will enhance the "scope of program" and "detection of aging effects" program elements by developing procedures to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low-level signals and where the instrumentation is not calibrated in-situ, such as the area radiation monitors. For the "scope of program" program element associated with the enhancement proposed by the applicant, the GALL Report states that this program applies to electrical cables used in circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation that are within the scope of license renewal.

For the "detection of aging effects" program element associated with the enhancement by the applicant, the GALL Report states that calibration provides sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptance criteria related to instrumentation loop performance. The normal calibration frequency specified in the plant technical specifications provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests for license renewal are to be completed before the period of extended operation.

As stated in the LRA, for instrumentation equipment in circuits that have sensitive, low-level signals, and where in-situ calibration is not performed, the applicant will develop procedures that use an alternate test method to confirm the condition of the cables and connectors. The testing may include insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable insulation condition. The tests will be completed prior to the period of extended operation and not to exceed a 10-year frequency. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 7.

The applicant stated that its program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits is consistent with the program as modified in the staff's ISG-15. ISG-15 requires that "review of calibration results or findings of surveillance program can provide an indication of the existence of aging effects based on acceptance criteria related to instrumentation circuit performance. By reviewing the results obtained during normal calibration or surveillance, an applicant may detect severe aging degradation prior to the loss of the cable and connection intended function. The first review will be completed before the end of the initial 40-year license term and at least 10 years thereafter. All calibration or surveillance results that fail to meet acceptance criteria will be reviewed for aging effects when the results are available." The staff reviewed the applicant’s program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits. The staff finds that the applicant's program does not require a review of calibration or surveillance results for indication of cable degradation. Since the enhancement, as proposed by the applicant, is not consistent with the staff's ISG-15, the staff requested that the applicant revise its program to include this requirement or provide justification of why the review of calibration or surveillance results is not necessary.

In a supplement letter dated December 3, 2004, the applicant provided its response. The applicant stated that to clarify the monitoring of aging effects for instrumentation cables that are tested in-situ, a commitment will be added to the LRA Appendix A, "FSAR Supplement" Section A2.1.9 for Unit 2 and Section A2.1.8 for Unit 3. This commitment is identified in the applicant’s license renewal commitment list in the MPS Units 2 and 3 LRA, Appendix A, Table A6.0-1, as Item 32 and Item 33, respectively. The applicant has committed to review calibration results for cables tested in situ to detect severe aging degradation of the cable insulation. The initial review will be completed prior to the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.

On the basis of its review, the staff finds the applicant's response acceptable because the applicant has committed to review calibration or surveillance results for indication of cable degradation, as required by ISG-15.

The staff concludes that this enhancement is acceptable because the alternate testing methodology will be in place, prior to the period of extended operation. The staff also finds by reviewing the results obtained during normal calibration or surveillance, that the applicant can detect severe aging degradation prior to the loss of the cable and connection intended function.

Operating Experience. The staff reviewed operating experience for the applicant’s program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits. The review indicated that this program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of instrumentation components. The applicant stated in the LRA that its review of prior operating experience has not identified any age-related degradation of instrumentation cables. As a part of the documentation supporting this program, the applicant reviewed condition reports involving cable or connection degradation for both units, and presented examples they considered in evaluating the effectiveness of the program. The staff reviewed the condition reports referenced in the applicant's license renewal project position paper for in-scope non-environmentally qualified instrumentation circuits with sensitive low-level signals and found the evaluation and disposition of the conditions as reported therein to be consistent with that conclusion.

The alternate cable testing that the applicant proposes as an enhancement, to be used when in-situ calibration is not performed, is a new part of the program, so no operating experience associated with this aspect of the program was available to the staff. The operating experience data associated with implementing this program will be addressed in the applicant's corrective action program.

On the basis of its review of the above operating experience, the staff concludes that the applicant's program for electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.9 of the MPS Unit 2 LRA and Appendix A, Section A2.1.8 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the applicant's program for electrical cables and connectors not subject to 10 CFR 50.49 EQ requirements used in instrumentation circuits. Also, in an LRA supplement letter dated December 3, 2004, the applicant stated that a commitment will be added to the LRA Appendix A, "FSAR Supplement" Section A2.1.9 for Unit 2 and Section A2.1.8 for Unit 3. The applicant has committed to review calibration results for cables tested in-situ to detect severe aging degradation of the cable insulation. The initial review will be completed prior to the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years. The staff reviewed these sections and the supplement and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the enhancement and confirmed that the implementation of this enhancement prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.7 Fire Protection Program

Summary of Technical Information in the Application. The applicant's fire protection program is described in LRA Section B2.1.10, "Fire Protection Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an exception and enhancements, with GALL AMPs XI.M26, “Fire Protection,” and XI.M27, “Fire Water System,” and with the revised guidance described in NRC ISG-04, “Aging Management of Fire Protection Systems for License Renewal,” dated December 3, 2002.

The applicant stated in the LRA that the fire protection program manages the aging effects of loss of material, cracking, and change of material properties for plant fire protection features and components. The program manages these aging effects through the use of periodic inspections and tests.

The applicant also stated in the LRA that the fire protection program manages the aging effects for the diesel-driven fire pump fuel supply line, the reactor coolant pump oil collection systems, and 10 CFR 50 Appendix R, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979,” support equipment.

The halon/carbon dioxide fire suppression systems for Units 2 and 3 are included within the scope of the license renewal program and subject to an AMR. The AMP for halon and carbon dioxide fire suppression systems for Unit 2 is consistent with GALL Report. However, the applicant takes exceptions over the AMP for halon and carbon dioxide fire suppression systems for Unit 3. Specifically the exception with the inspection interval to test the halon and carbon dioxide fire suppression systems every 12-month and 18-month respectively, instead of biannually as recommended by the GALL Report.

In addition, the applicant stated in the LRA that visual inspection of fire protection piping internal surfaces that are exposed to water is performed when the system is opened for maintenance and/or repair. The work control process provides guidance for the performance of internal inspections of fire protection piping and components whenever the system is entered for maintenance or repair.

Staff Evaluation. During its audit and review, the staff confirmed the applicant’s claim of consistency with the GALL Report. Details of the staff’s audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and enhancements and their justifications to determine whether the AMP, with the exception and enhancements, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.10 of the LRA, the applicant stated that the fire protection program is consistent with GALL AMPs XI.M26 and XI.M27, and with the revised guidance described in NRC ISG-04, with an exception and enhancements. The fire protection program takes an exception to inspection interval to test the halon and carbon dioxide fire suppression system for Unit 3 every 12-month and 18-month respectively, instead of biannually as recommended by the GALL Report.

> Exception 1: XI.M26 - Aging Management of the Halon and Carbon Dioxide Systems NUREG-1801 recommends that periodic visual inspection and function tests of Halon and CO_2 fire suppression systems be performed at once every six months to detect degradation in the system. Per the Millstone Unit 3 Current Licensing Basis (CLB), the Technical Requirements Manual (TRM) requires functional tests of the Unit 3 Halon and CO_2 systems be performed at a 12-month and 18-month frequency, respectively. In addition, (not required by the TRM) comprehensive system walkdowns inspections are performed by the system engineer on an annual basis. Plant operating experience has

demonstrated that this frequency is adequate to maintain the intended function of these systems.

Exception 2: XI.M26 - Aging Management of the Halon and Carbon Dioxide Systems NUREG-1801 recommends that periodic visual inspection and function tests of Halon and CO_2 fire suppression systems be performed at once every six months to detect degradation in the system. In lieu of a functional test of the Unit 3 Normal Switchgear Area, the Auxiliary Boiler Enclosure Fuel Oil Pump Pit, and the Alternator/Exciter Bearing and Casing Enclosure CO_2 systems, comprehensive system walkdowns inspections are conducted on an annual basis. These walkdowns visually verify that degradation of the system is not occurring. Any noticeable degradation is addressed using the Corrective Action Program.

The staff reviewed Exception 1, plant operating experience and fire surveillance procedures. Plant operating experience indicate that no aging effects have been identified in the halon and CO_2 systems and components and that there has been no aging-related event that has adversely affected systems operation. Therefore, the staff concluded that 12-month and 18-month test interval frequency for Unit 3 halon and CO_2 fire suppression systems respectively will be sufficient to detect aging of halon and CO_2 fire suppression systems. The 12-month and 18-month test interval frequency is included in the Millstone Unit 3 CLB.

The staff reviewed Exception 2, and concurred that the CO_2 fire suppression system protecting Unit 3 normal switchgear area, the auxiliary boiler enclosure fuel oil pump pit, and the alternator/exciter bearing and casing enclosure does not required a function test, since these areas do not contain any safety-related equipment or equipment that is important to safety. Annual system walkdowns are adequate for managing the effect of aging of CO_2 fire suppression system in these areas.

In addition, the applicant stated in the LRA that the fire protection program will be enhanced for the “detection of aging effects” program element such that a baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components whose internal surfaces are exposed to raw water to confirm there is no degradation.

For the detection of aging effects program element associated with the enhancement by the applicant, the GALL Report states that visual inspection of fire protection system internals will be used for monitoring the age-related degradation of system piping and component internals.

ISG-4 provides additional guidance as follows:

> However, internal inspections performed during each refueling cycle by disassembling portions of the fire protection system piping, as stated in GALL AMP XI.M27, may not be the most effective means to detect this aging effect. Each time the system is opened, oxygen is introduced into the system and this accelerates the potential for general corrosion. Therefore, the staff recommends that the applicant perform a baseline pipe wall thickness evaluation of the fire protection piping using a non-intrusive means of evaluating wall thickness, such as volumetric inspection, to detect this aging effect before the current license term expires.

The applicant stated in the LRA that it will evaluate, develop, and implement appropriate activities (e.g., baseline inspections) for assessing the buried fire water system piping to identify or preclude wall thinning due to internal corrosion prior to the period of extended operation. Consistent with ISG-4, the applicant stated that subsequent inspections may be required based on engineering evaluation. The staff finds this enhancement is required and is acceptable as any such changes to the fire protection program will provide additional assurance that the effects of aging will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the MPS Units 2 and 3 LRA, Appendix A, Table A6.0-1, Item 8.

The applicant also stated in the LRA that the fire protection program will be enhanced for the "preventive actions" and "detection of aging effects" program elements such that testing or replacing a representative sample of sprinkler heads that have been in service for 50 years is not specifically included in the applicant's fire protection program. Licensee follow-up action items have been initiated to ensure that a representative sample of sprinkler heads will be tested, or all affected sprinkler heads will be replaced in accordance the requirements of the National Fire Protection Association (NFPA) Code 25, Section 2.3.3.1. This commitment is also identified on the applicant's license renewal commitment list in the LRA, Appendix A, Table A6.0-1, Item 9.

For the preventive actions and detection of aging effects program elements associated with the with the second enhancement, the GALL Report states that this program element identifies methods or techniques to ensure appropriate fire prevention measures are maintained and no significant degradation occurs (XI.M26 and XI.M27). To ensure no significant corrosion, MIC, or biofouling has occurred in water-based fire protection systems, periodic flushing, system performance testing, and inspections are conducted (XI.M27). This program element identifies methods or techniques to ensure timely detection of aging effects (XI.M26 and XI.M27). Sprinkler systems are inspected once every refueling outage to ensure that signs of degradation, such as corrosion, are detected in a timely manner (XI.M27).

ISG-4 provides additional guidance as follows:

> NFPA 25, 1999 Edition, Section 2.3.3.1, "Sprinklers," states, where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing. NFPA 25 also contains guidance to perform this sampling every 10 years after the initial field service testing.
>
> The 50-year service life of sprinkler heads does not necessarily occur at the 50th year of operation in terms of licensing. The service life is defined from the time the sprinkler system is installed and functional. The staff recommends, in accordance with NFPA 25, that sprinkler head testing should be performed at year 50 of sprinkler system service life, not at year 50 of plant operation, with subsequent sprinkler head testing every 10 years thereafter.

The staff noted that applicant stated in the LRA that it has included follow-up items to accommodate the requirements of NFPA 25 but does not clearly state when the fire protection program will identify and test, or replace, sprinkler heads. During the audits, the staff requested that the applicant clarify this enhancement. In LRA supplement letter dated July 7, 2004, the applicant stated the following:

The commitment regarding sprinkler head testing or replacement should have the wording “The first tests will be completed prior to the sprinkler heads achieving 50 years of service life. The frequency of subsequent tests will not exceed a 10-year interval.” inserted after the words “Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program.” This commitment appears in the Unit 2 LRA and the Unit 3 LRA in the following locations:

Unit 2 Appendix B, Section B2.1.10
Unit 3 Appendix B, Section B2.1.10
Unit 2 Appendix A, Section A2.1.10
Unit 3 Appendix A, Section A2.1.9

The staff finds that this enhancement is consistent with the recommendations set forth in ISG-4. On that basis, the staff finds this enhancement is required and is acceptable as any such changes to the fire protection program will provide additional assurance that the effects of aging will be adequately managed.

Operating Experience. The staff reviewed operating experience for the applicant’s fire protection program. The review indicated that the fire protection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of the fire protection system components.

In the LRA, the applicant stated that component inspections and surveillance tests are performed in compliance with the applicable sections of the corresponding technical requirements manuals and in accordance with approved station procedures. Surveillance tests have been performed routinely and have been successful in identifying fire protection suppression system degradation. Station operating experience indicates that while degradation has occurred, the fire protection program has been effective in identifying any anomalies, implementing corrective actions, and trending the parameters. When inspection results have exceeded allowable values, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

On the basis of its review of the above operating experience, the staff concludes that the fire protection program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.10 of the MPS Unit 2 LRA, Appendix A, Section A2.1.9 of the MPS Unit 3 LRA, and the July 7, 2004, LRA supplement, the applicant provided the FSAR supplement for the fire protection program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant’s program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.8 Flow-Accelerated Corrosion

Summary of Technical Information in the Application. The applicant's flow-accelerated corrosion program is described in LRA Section B2.1.11, "Flow-Accelerated Corrosion." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an exception, with GALL AMP XI.M17, "Flow-Accelerated Corrosion."

The applicant stated in the LRA that the flow-accelerated corrosion (FAC) program manages the aging effect of loss of material in accordance with the EPRI guidelines defined in the Nuclear Safety Analysis Center (NSAC) Report, NSAC-202L, "Recommendation for an Effective Flow Accelerated Corrosion Program," Revision 1, dated January 1996. The FAC program includes controls to assure that the structural integrity of carbon steel and low-alloy steel piping and components is maintained.

The applicant further stated in the LRA that specific procedures and methods satisfy NRC Bulletin 87-01, "Thinning of Pipe Wall in Nuclear Power Plants," dated July 9, 1987, and NRC GL- 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning," dated May 2, 1989. The program predicts, detects, and monitors FAC as identified by wall thinning (loss of material) in plant piping and components.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and its justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.11 of the LRA, the applicant stated that the flow-accelerated corrosion program is consistent with GALL AMP XI.M17, with an exception. The flow-accelerated corrosion program takes exception to the "scope of program" program element in that GALL AMP XI.M17 recommends that the program follow guidance identified in NSAC-202L, "Recommendation for an Effective Flow-Accelerated Corrosion Program," Revision 2. The MPS program is based on Revision 1 of the same guidance.

The applicant stated in the LRA that it reviewed the differences between the two revisions of NSAC-202L and concluded that no changes that are relevant to the flow-accelerated corrosion program were made from Revision 1 to Revision 2.

The staff reviewed NSAC-202L and relevant current EPRI technical documents, and interviewed the applicant's technical staff. On the basis of these reviews and interviews, the staff concludes that the differences between the two revisions are not applicable to the flow-accelerated corrosion program and, therefore, finds this exception to be acceptable.

Operating Experience. The staff reviewed operating experience for the applicant's flow-accelerated corrosion program. The number of planned and unplanned replacements has generally trended downward over the past several years due to the establishment of the flow-accelerated corrosion program and following the recommendations identified in NSAC-202L.

The applicant stated in the LRA that operating experience indicates that while wall thinning has occurred since implementation of the flow-accelerated corrosion program, the flow-accelerated corrosion inspection activities have effectively identified degraded components for repair or replacement. These corrective actions have been effective in maintaining the integrity of FAC-susceptible components.

On the basis of its review of the above operating experience, the staff concludes that the flow-accelerated corrosion program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.11 of the MPS Unit 2 LRA and Appendix A, Section A2.1.10 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the flow-accelerated corrosion program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.9 Fuel Oil Chemistry

Summary of Technical Information in the Application. The applicant's fuel oil chemistry program is described in LRA Section B2.1.12, "Fuel Oil Chemistry." In the LRA, the applicant stated that this is an existing program. This program is consistent, with six exceptions, with GALL AMP XI.M30, "Fuel Oil Chemistry."

The applicant stated in the LRA that the fuel oil chemistry program activities control the aging effect of loss of material by monitoring and controlling fuel oil quality to ensure that it is compatible with the materials of construction for in-scope components containing diesel fuel oil. Fuel oil quality limits are established to ensure the operability of the respective diesels, and compliance with applicable technical specifications and technical requirements, and to reduce the likelihood of loss of material within the fuel oil systems. The program basis document indicates that poor fuel oil quality could lead to (1) degradation of fuel oil storage tanks or (2) accumulations of particulate or biological growth that could interfere with the operation of plant equipment.

The applicant stated, as documented in the staff's MPS audit and review report for the fuel oil chemistry program, that the fuel oil chemistry program involves the sampling and testing of fuel oil used for equipment that is within the scope of license renewal. Testing is performed to ensure the acceptability of fuel oil quality, thus maintaining the integrity of the fuel oil system. The fuel oil chemistry sampling and testing activities mitigate the aging effect of loss of material in the fuel oil system. The effectiveness of the fuel oil chemistry program for in-scope tanks is verified by the tank inspection program, and by the work control process for other diesel fuel system components. These programs provide input to the corrective action program if aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the fuel oil chemistry program.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exceptions and their justifications to determine whether the AMP, with exceptions, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.12 of the LRA, the applicant stated that the fuel oil chemistry program is consistent with GALL AMP XI.M30, with exceptions. The fuel oil chemistry program takes exception to the "preventive actions," "detection of aging effects," and "monitoring and trending" program elements such that (1) this program does not include the addition of biocides, stabilizers, or corrosion inhibitors and (2) sampling and testing of the fuel and dewatering of the security diesel fuel oil storage tank is performed semi-annually. For the program elements associated with the first and second exceptions taken by the applicant, the GALL Report states that the quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks. Coatings, if used, prevent or mitigate corrosion by protecting the internal surfaces of the tank from contact with water and microbiological organisms.

Degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards and periodic multi-level sampling provide assurance that fuel oil contaminants are below acceptable levels. Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.

Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.

The applicant stated in the LRA that the fuel oil chemistry program does not include the addition of biocides, stabilizers, or corrosion inhibitors. Operating experience and sample results confirm that microbiologically influenced corrosion (MIC) and breakdown of the fuel oil have not been issues requiring the use of fuel oil additives. On the basis of its review of the operating experience and determination that mitigation of the effects of MIC and fuel oil breakdown has not necessitated the use of fuel oil additives at MPS, the staff finds the first exception to be acceptable.

The applicant stated, as documented in the staff's MPS audit and review report for the fuel oil chemistry program that, although the Unit 3 emergency diesel fuel tanks and the station blackout storage tanks are coated, these coatings are not credited for preventive actions for the purpose of license renewal. The applicant stated that the fuel oil tanks are included in the tank inspection program and are subjected to a 10-year draining, cleaning, and inspection activity. The applicant added the diesel fire pump fuel oil tank and the security diesel fuel oil storage tank to the tank inspection program, so that they undergo the semi-annual tank inspection and cleaning in order to mitigate corrosion at the bottom of the tanks. The staff reviewed four work orders that documented that the security diesel fuel oil storage tank was tested and dewatered on a semi-annual basis beginning in July 2002. The results indicate that no water has been found.

The GALL AMP XI.M30 detection of aging effects program element recommends periodic, multilevel sampling and visual inspection of the internal surfaces of the tanks that are drained for cleaning. In addition, the GALL AMP XI.M30 monitoring and trending program element recommends that water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. As documented in the staff's MPS audit and review report for the fuel oil chemistry program, the applicant stated that loss of material is an aging effect that is detected through condition monitoring via periodic tank inspection activities. In addition, the applicant stated that implementation of new fuel oil testing and periodic multilevel surveillance for fuel oil quality in the various storage tanks is accomplished using surveillance procedures and automated work orders. Periodic sampling and testing is performed monthly for the Unit 3 emergency diesel fuel oil storage tanks, quarterly for most of the in-scope tanks, and semi-annually for the security diesel fuel oil storage tank. The staff requested that the applicant add justification for this exception to the GALL Report (e.g., the size of the tank, negligible water accumulation due to the location of the tank outlet piping connection, and the frequency of fuel oil testing) to the fuel oil chemistry program.

In a subsequent onsite visit to the plant, the applicant presented the staff with Revision 3 of the fuel oil chemistry program, as documented in the staff's MPS audit and review report, which provides justification for size and frequency of testing. However, Revision 3 does not acknowledge that there would be negligible accumulation in the tank due to the location of the tank outlet. During its review of the tank drawings, the applicant confirmed that the outlet is on the bottom of the side of the tank and not directly on the bottom of the tank. Therefore, the applicant did not make the statement that there would be a negligible amount of accumulation in the tank. The staff reviewed the examples of operating experience regarding the "like new" condition of the tank internals and the lack of water found in the fuel oil tanks and discussed the examples with the applicant. On the basis of its review of this operating experience and the clarifications provided by the applicant in Revision 3, as documented in the staff's MPS audit and review report for the fuel oil chemistry program, the staff finds the second exception to be acceptable.

The fuel oil chemistry program also takes exception to the "parameters monitored/inspected" and "acceptance criteria" program elements such that (3) this program uses an unmodified ASTM D 2276 Method A for the determination of particulates. For the program elements associated with the third exception taken by the applicant, the GALL Report states that for determination of particulates, modified ASTM D 2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 micrometers (μm), instead of 0.8 μm. These are the principal parameters relevant to tank structural integrity.

Modified ASTM D 2276, Method A, is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 μm, instead of 0.8 μm.

The applicant stated in the LRA that the fuel oil chemistry program does not use the modified ASTM Standard D 2276, Method A, for determination of particulates. The unmodified version of the same standard is used. The unmodified version is considered to be more conservative than the modified version because it uses a smaller filter pore size. On the basis that the applicant uses a more conservative version of the ASTM standard for the determination of particulates, the staff finds the third exception to be acceptable.

The fuel oil chemistry program also takes exception to the “detection of aging effects” program element such that (4) the in-scope tanks are included in the tank inspection program, which provides for ultrasonic testing activities based on the evaluation of the conditions found during visual inspections. For the program element associated with the fourth exception taken by the applicant, the GALL Report states that degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards and periodic multilevel sampling provide assurance that fuel oil contaminants are below acceptable levels. Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.

As documented in the staff’s MPS audit and review report for the fuel oil chemistry program, the applicant stated that loss of material is detected through condition monitoring via periodic tank inspections. However, the ultrasonic thickness measurement of the tanks is not addressed in this report. The applicant stated in the LRA that the in-scope tanks are included in the tank inspection program, which provides for ultrasonic testing activities based on an evaluation of the conditions found during visual inspections. On the basis that the tank inspection program provides an adequate means for evaluating the integrity of the tank internals, the staff finds the fourth exception to be acceptable.

In addition, the fuel oil chemistry program takes exception to the “preventive actions” program element in that (5) this program cannot perform dewatering of the Unit 2 emergency diesel day tanks because the bottom drains are located in the side of the tanks. For the program element associated with the fifth exception taken by the applicant, the GALL Report states that the quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks. Coatings, if used, prevent or mitigate corrosion by protecting the internal surfaces of the tank from contact with water and microbiological organisms.

The applicant stated in the LRA that the fuel oil chemistry program cannot perform dewatering of the Unit 2 emergency diesel day tanks because the bottom drains are located on the side of the tanks. However, the applicant also stated that the tanks are inspected and cleaned as required by the tank inspection program. The staff reviewed the examples of operating experience regarding the “like new” condition of the tank internals and the lack of water found in the fuel oil tanks and discussed these findings with the applicant. On the basis of its review of the operating experience and discussion with the applicant, the staff concludes that corrosion caused by prolonged water contact with tank bottoms is not an aging effect of significance for the Unit 2 emergency diesel day tanks and, therefore, finds the fifth exception to be acceptable.

Also, the fuel oil chemistry program takes exception to the “parameters monitored/inspected” and “acceptance criteria” program elements such that (6) the Unit 3 technical specifications require the use of American Society for Testing and Materials (ASTM) Standard D 1796 for the determination of water and sediment contamination in the diesel fuel. For the program elements associated with the sixth exception taken by the applicant, the GALL Report states that the AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D 4057 is used for guidance on oil sampling. The ASTM Standards D 1796 and D 2709 are used for determination of water and sediment contamination in diesel fuel.

The ASTM Standards D 1796 and D 2709 are used for guidance on the determination of water and sediment contamination in diesel fuel.

The applicant stated in the LRA that the Unit 3 technical specifications require the use of ASTM Standard D 1796 for the determination of water and sediment contamination in the diesel fuel. The fuel oil chemistry program is a common program for both Units 2 and 3 and the fuel oil for both units is procured to the same specification. The staff review of the ASTM Standards D 1796 and D 2709 reveals that ASTM D 1796 is acceptable for the fuel oil used at Unit 2 based on the Unit 3 technical specification requirement to use ASTM D 1796 and the fact that the program is common to Units 2 and 3. On the basis of its review, the staff finds the sixth exception to be acceptable.

<u>Operating Experience</u>. The staff reviewed operating experience for the applicant’s fuel oil chemistry program. The applicant stated in the LRA that operating experience indicates that while fuel oil deliveries from commercial vendors and tank samples do not always meet MPS quality specifications, fuel oil chemistry activities are effective in identifying any anomalies, implementing corrective actions, and trending the parameters. When chemistry results have exceeded allowable values, corrective actions have been implemented to ensure that the quality of the fuel oil in the storage tanks has not been compromised and that the continued use of the fuel oil in the other tanks is considered based on the extent of condition requirements of the corrective action program. The applicant further stated that no failures of fuel oil system components were identified at MPS due to contamination or water-induced degradation.

On the basis of its review of the above operating experience, the staff concludes that the fuel oil chemistry program adequately manages the aging effects that have been observed at the applicant’s plant.

<u>FSAR Supplement</u>. In Appendix A, Section A2.1.12 of the MPS Unit 2 LRA and Appendix A, Section A2.1.11 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the fuel oil chemistry program. The staff reviewed these sections and determined that the

information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.10 Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Technical Information in the Application. The applicant's program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements is described in LRA Section B2.1.14, "Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with an exception and an enhancement, with GALL AMP XI.E3, "Inaccessible Medium Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

The applicant stated in the LRA that its program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements manages the aging effect of formation of water trees and ensures that inaccessible medium-voltage cables within the scope of license renewal that have been submerged and exposed to significant voltage will remain capable of performing their intended function. Exposure to both conditions is necessary for age-related degradation of insulation resulting from water treeing. This program considers the combined effects of submergence (i.e., significant moisture exposure) and significant voltage exposure, using the definitions for these exposures as defined in GALL AMP XI.E3. This program identifies areas where the potential for submergence exists, and relies upon inspection and pumping of cable vaults, manholes, and handholes to prevent significant moisture exposure. The inspections verify that the cables, including those protected by conduit, are not submerged and that no evidence of cable submergence since the last inspection is detected.

The applicant's structures monitoring program ensures that underground cable enclosures such as vaults, manholes, and handholes containing in-scope medium-voltage cables, which could potentially become submerged, are pumped and inspected at specified frequencies. Pumping frequencies are adjusted as necessary to ensure that cables do not become submerged between preventive maintenance activities. The staff reviewed the applicant's structures monitoring program, as documented in the staff's MPS audit and review report, which describes preventive maintenance work orders associated with the structures monitoring program.

The applicant stated, as documented in the staff's MPS audit and review report for the structures monitoring program, that if in-scope medium-voltage cables are found to have been exposed to significant moisture under significant voltage conditions, the structures monitoring program personnel will coordinate with engineering to ensure that the cables are evaluated to assess any potential impact on the integrity of the insulation.

GALL AMP XI.E3 stipulates that any tests that might be performed will be proven tests for detecting deterioration of the insulation due to wetting, and will be acceptable to the nuclear industry and the NRC. Examples of possible test methods considered power factor, partial discharge, or polarization index, as described in EPRI Technical Report TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," dated August 1994, or other appropriate testing.

The applicant stated in the LRA that the program will consider the technical information and guidance cited in GALL AMP XI.E3 that is provided by EPRI TR-109619, IEEE Std 1205-2000, NUREG/CR-5643, and SAND96-0344.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exception and enhancement and their justifications to determine whether the AMP, with the exception and enhancement, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.14 of the LRA, the applicant stated that the applicant's program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements is consistent with GALL AMP XI.E3, with an exception and enhancement. The program takes exception to the "scope of program," "parameters monitored/inspected," and "detection of aging effects" program elements such that an engineering evaluation will be performed to determine the appropriate actions to fully address the identified condition of the cables, including the identification of testing requirements as necessary, and the corresponding test frequency should evidence of submerged medium-voltage cables with significant voltage be identified.

The staff noted that inaccessible medium-voltage cables may be exposed to condensation and wetting in inaccessible locations, such as conduits, cable trenches, cable troughs, and duct banks. When an energized medium-voltage cable is exposed to wet conditions for which it is not designed, water treeing or a decrease in the dielectric strength of the conductor insulation can occur. Water trees occur when the insulating materials are exposed to long-term, continuous electric stress and moisture; these water trees eventually result in breakdown of the dielectric and ultimate failure. The growth and propagation of water trees is somewhat unpredictable.

The applicant stated that its program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements uses periodic actions, such as pumping and inspection of cable vaults (manholes), to prevent cables from being submerged. In the event that submerged cables are found, an engineering evaluation will be performed and the appropriate testing required will be specified, as necessary to confirm the condition of the cable insulation. For the program elements associated with the exception taken by the applicant, the GALL Report states that in-scope, inaccessible medium-voltage cables exposed to significant moisture (periodic exposure to moisture that last more than few days) and significant voltage are tested at least once every 10 years to provide an indication of the cable insulation condition.

During the audit, the staff requested that the applicant provide the frequency of manholes inspection and technical justification of how visual inspections are adequate to conclude that the cables are not subject to significant moisture that lasts more than few days.

In a supplement letter dated December 3, 2004, the applicant stated that it has identified two Unit 3 duct lines with low points that are susceptible to moisture accumulation. These two duct lines contain 26 in-scope medium-voltage cables. No similar duct lines were identified for Unit 2. Prior to the period of extended operation, these cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function.

Further, the applicant stated that the other duct banks for both units are not susceptible to moisture accumulation due to the slope of the embedded conduit between manholes and the inspections performed by the applicant's structures monitoring program. The duct banks consist of 5-inch Schedule 40 PVC pipe embedded in reinforced concrete, which is founded on dense soil over bedrock. The applied contact pressure by the duct banks is well below the allowed bearing pressure of the supporting material resulting in insignificant settlement (Ref. Unit 2 FSAR Section 2.7.5.2). Therefore, the duct banks will maintain the design cable run slope to their respective termination points in manholes or buildings and the structures monitoring program inspections will identify any water intrusion.

For the cable in these duct banks, the design, in conjunction with the structures monitoring program inspections, ensures that any cable that becomes submerged will be identified by the structures monitoring program inspections. The inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements program currently addresses the testing of cables that have been submerged. For the cables that have not been submerged, the aging effect of water treeing is precluded and testing is not required.

To implement the testing of inaccessible medium-voltage cables identified in the two Unit 3 duct lines with low points that are susceptible to moisture accumulation, the applicant will add the following commitment to the MPS LRA Appendix A, "FSAR Supplement" Unit 2, Section A2.1.14 and Unit 3, Section A2.1.13:

> Testing of Inaccessible Medium-Voltage Cables:
>
> "The Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTX-XSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) have low points that are susceptible to moisture accumulation. Prior to the period of extended operation, the in scope cables in these two duct lines will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function. Subsequent testing will be performed on a frequency not to exceed a 10-year interval."

An additional item will be added to Unit 2 and Unit 3 Appendix A "FSAR Supplement," Table A6.0 -1 as follows:

> Item: "33" (Unit 2) and "34" (Unit 3)
>
> <u>Commitment</u> - "The in scope cables in Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTXXSR-B to 6.9kV Normal Switchgear

Bus 35A, 35B, 35C and 35D) will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function."

Source - "Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"

Schedule - "Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter."

The staff reviewed the applicant's response. The staff finds, other than the duct lines #929 and #973 (26 cables) which the applicant committed to test, that the slope of these duct banks between manholes and the inspection performed, as required by the applicant's structures monitoring program, are not adequate to preclude significant moisture for these duct banks. It was not clear to the staff how the applicant's structures monitoring program will identify water intrusion in these duct banks because these banks are underground and are not accessible.

Periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspection of water collection in cable manholes and conduit, and draining the water, as needed. However, those actions are not sufficient to assure that water is not trapped elsewhere in the raceways. For example, if duct bank conduit has low points in the routing, there could potentially be long term submergence at these low points. In addition, concrete raceways may crack due to soil settling over a long period of time and that the conduit between manhole covers may not be water tight. Additionally, in certain areas, the water table is high in seasonal cycles and therefore, the raceways may get refilled with water soon after purging. Further, the potential uncertainties involved with water trees exist even with duct banks that are sloped to minimize water accumulation. Experience has shown that insulation degradation will occur if the cables are exposed to 100 percent relative humidity. Periodically removal of water in manholes is required to minimize the potential for insulation degradation. In addition to removal of water, in-scope, medium-voltage cables exposed to significant moisture and significant voltage must be tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test and is to be a proven test for detecting deterioration of the insulation material due to wetting.

The staff finds, other than the duct lines #929 and #973 (26 cables) which the applicant committed to test, that the slope of these duct banks between manholes and the inspection performed, as required by the applicant's structure's monitoring program, are not adequate to preclude significant moisture for these duct banks.

On the basis of its review, the staff finds that the slope of these duct banks between manholes and the inspection performed, as required by the applicant's structures monitoring program, are not adequate to preclude significant moisture for these duct banks and not adequate to prevent cables from being subject to water trees due significant moisture and significant voltage. The staff determined that inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirement AMP at MPS are not consistent with GALL AMP XI.E3. In its letter dated January 11, 2005, the applicant stated that it has decided to perform testing of a representative sample of inaccessible medium-voltage cables. The applicant stated that the following commitment will be added to its LRA Appendix A, FSAR Supplement Unit 2 Section A2.1.14 and Unit 3 Section A2.1.13:

- Sample Testing of Inaccessible Medium-Voltage

  Prior to the period of extended operation, a representative sample of inscope medium-voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function. This sample testing is in addition to the testing specified in the previous commitment. Subsequent testing will be performed on a frequency not to exceed a 10-year interval.

  This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments as Item (34 for Unit 2) (35 for Unit 3).

An additional item will be added to Millstone Power Station Unit 2 and Unit 3 Appendix A FSAR Supplement, Table A6.0-1 as follows:

> Item: 34 (Unit 2) and 35 (Unit 3)
>
> <u>Commitment</u> - In addition to the testing specified in Commitment (33 for Unit 2) (34 for Unit 3), a representative sample of in-scope medium-voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function.
>
> <u>Source</u> - Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Environmental Qualification Requirements.
>
> <u>Schedule</u> - Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter.

The staff reviewed the applicant response and finds it acceptable because in addition to inspect manholes and draining water, as needed, the applicant will also test a representative sample of inaccessible medium-voltage cables which would provide an indication of the condition of the cable insulation.

The applicant stated in the LRA that it will enhance the program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements “scope of program” and “detection of aging effects” program elements such that engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables having significant voltage and having been submerged. If cables have become submerged during the period of extended operation, engineering will evaluate to determine the appropriate testing, as necessary, to be performed during the corresponding ten-year interval. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 11.

The applicant stated in the LRA that the enhancement uses periodic action, such as pumping of cable vaults to prevent cables from being submerged and inspections to determine that cables are not submerged. In the event that submerged cables are found, an engineering evaluation will be performed and the appropriate testing required will be specified, as necessary to confirm the condition of the cable insulation. The staff finds that periodic action, as suggested by the applicant's program, may not be sufficient as compared to GALL AMP XI.E3. In its letter dated January 11, 2005, the applicant committed to inspect manholes and test a representative sample of inaccessible medium-voltage cables to provide an indication of the condition of cable insulation. The staff reviewed the applicant's response and finds the applicant's response acceptable.

Operating Experience. The staff reviewed operating experience for the applicant's inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements program. The applicant stated during audit discussions that there was minimal plant-specific operating experience regarding the testing of non-environmentally qualified, medium-voltage cables to confirm the condition of insulation after submergence. The applicant stated that it recently established the periodic pumping and inspections of cable vaults, manholes, and handholes based on industry operating experience with submerged cables and the recognition of water treeing as an aging effect. The operating experience data associated with implementing this aspect of the program is being addressed in the applicant's corrective action program.

The staff's review of prior operating experience included the applicant's evaluation of condition reports addressing issues similar to those identified in NRC Information Notice 2002-12, "Submerged Safety-Related Electrical Cables," dated March 2002. Initial investigations by the applicant determined that some manholes containing safety-related cables had the potential for cable submergence. Each unit identified seven manholes with this potential vulnerability. The Unit 3 manholes had been governed by a preventive maintenance program whereby they were being routinely inspected and pumped out as necessary. Through this program, the applicant concluded that the Unit 3 cables had not been submerged.

Unit 2 did not have a similar preventive maintenance program. Therefore the applicant concluded that the Unit 2 cables in question might have been submerged. To address this concern, the applicant identified the specific safety-related cables and reviewed the applicable purchase specifications, manufacturers' specifications, and qualification records. The applicant also inspected the cables for indications of degradation resulting from submergence, but found none. The applicant's engineering evaluation determined that the cables were acceptable for continued use. The applicant added the Unit 2 manholes to a preventive maintenance program requiring periodic inspection and pumpout (if necessary) of the manholes.

On the basis of its review of the above operating experience, the staff concludes, that the applicant's program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.14 of the MPS Unit 2 LRA and Appendix A, Section A2.1.13 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements program. The staff reviewed these sections, together with the supplement letters, and determined the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.11 Inservice Inspection Program: Containment Inspections

Summary of Technical Information in the Application. The applicant's inservice inspection program for containment inspections is described in LRA Section B2.1.16, "Inservice Inspection Program: Containment Inspections." In the LRA, the applicant stated that this is an existing program. This program is consistent, with exceptions, with GALL AMPs XI.S1, "ASME Section XI, Subsection IWE;" XI.S2, "ASME Section XI, Subsection IWB;" and XI.S4, "10 CFR Part 50, Appendix J."

The applicant stated in the LRA that the inservice inspection program: containment inspections program manages the aging effects of change of material properties, cracking, and loss of material. The program is consistent with the ASME "Boiler and Pressure Vessel Code," Section XI, Subsections IWE and IWB, and 10 CFR 50.55a(b)(2), which provide the criteria for inservice inspections of containment structural components. ASME Section XI, Subsection IWE specifies the examination requirements for steel containments (Class MC) and the steel liners of concrete containments (Class CC), including their integral attachments. ASME Section XI, Subsection IWB specifies the examination requirements for reinforced and prestressed concrete containments (Class CC).

The scope of Subsection IWE and IWB examinations includes the surface areas and components identified in IWE-1231 and IWB-1210. Exempted or inaccessible areas as allowed by Subsections IWE and IWB are specifically identified by the program.

The applicant stated in the LRA that the prestressed, post-tensioned concrete containment is assessed pursuant to the examination requirements of ASME Section XI, Subsection IWB, Examination Category L-B for unbonded post-tensioning systems. Examination requirements similar to those specified in Subsection IWB are also identified in the technical specifications in order to meet the requirements of Regulatory Guide 1.35, "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments," Revision 3, dated July 1990.

Appendix J leakage rate testing is included as part of the inservice inspection program: containment inspections. The program implements Type A tests to measure the overall primary containment integrated leakage rate.

Prestress on the Unit 2 containment tendons is expected to decrease over the life of the unit as a result of such factors as elastic deformation, creep and shrinkage of concrete, anchorage seating losses, tendon wire friction, stress relaxation, and corrosion. The evaluation of containment tendon examination and surveillance test results is considered a time-limited aging analysis (TLAA) for license renewal. This TLAA is addressed in the Unit 2 LRA, Section 4.5, and is addressed in Section 4 of this SER.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the exceptions and their justifications to determine whether the AMP, with the exceptions, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.16 of the LRA, the applicant stated that the inservice inspection program: containment inspections is consistent with GALL AMPs XI.S1, XI.S2, and XI.S4, with exceptions. The inservice inspection program: containment inspections takes exception to the "scope of program," "parameters monitored/inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements such that GALL AMPs XI.S1 and XI.S2 cover both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda of ASME Section XI, as approved in 10 CFR 50.55a. The ASME Section XI, Subsections IWE/IWB inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. Significant changes have been made to Subsections IWE/IWB between these respective Code editions.

The staff noted that the ASME Section XI, Subsections IWE and IWB inservice inspection program complies with an edition of Section XI approved by the NRC for use at MPS. The NRC mandated that all operating reactor licensees bring their Code of record uniformly compliant with the ASME Section XI, 1998 Edition with no addenda, which is current with programs such as the Program Demonstration Initiative (66 FR 40626).

On the basis that the Code edition of record for MPS is a later version of the ASME Section XI Code that also meets the intent of the GALL Report, the staff finds the first exception to be acceptable.

The inservice inspection program: containment inspections also takes exception to the "scope of program" program element in that the program credits only the Type A integrated leak rate test to manage the effects of aging. For the program element associated with the second exception taken by the applicant, the GALL Report states that the scope of the containment leakage rate testing program includes all pressure-retaining components. Two types of tests are implemented. Type A tests are performed to measure the overall primary containment integrated leakage rate. Type B tests are performed to measure local leakage rates across each pressure-containing or leakage-limiting boundary for containment penetrations. Type A and B tests described in 10 CFR 50, Appendix J, are acceptable methods for performing these leakage rate tests. Leakage testing for containment isolation valves (normally performed under Type C tests), if not included under this program, is included under leakage rate testing programs for systems containing the isolation valves.

The applicant stated in the LRA that the inservice inspection program: containment inspections credits only Type A integrated leak rate testing to manage the effects of aging. However, the staff noted that the Type B test is a local leak rate test intended to measure leakage of containment penetrations whose design incorporates resilient seals and gaskets, including air locks door seals and equipment hatch gaskets. The staff found that not crediting the Type B test in accordance with the guidance in GALL AMP XI.S.4 was unacceptable and requested additional clarifications from the applicant regarding how the aging effects on resilient seals and gaskets, including air locks door seals and equipment hatch gaskets, will be managed. In an LRA supplement letter dated July 7, 2004, the applicant stated the following:

> For Unit 2 and Unit 3 Appendix B, Section B2.1.16 (page B-63), the fourth paragraph should read:
>
> "The Containment Appendix J Leakage Rate Test Program implements Type A tests to measure the overall primary Containment integrated leakage rate (ILRT) and Type B tests to detect and measure local leakage across each pressure-containing or leakage limiting boundary for Containment penetrations, airlock doors and hatches, whose design incorporates a resilient seal, gasket or expansion bellows, and for electrical penetrations."
>
> For Unit 2 and Unit 3 Appendix B, Section B2.1.16, Exception 2: XI.S4 - Leak Rate Testing (page B-67), the exception wording should read:
>
> "The NUREG-1801, Section XI.S4 discusses 10 CFR 50 Appendix J, Type A Integrated Leak Rate Testing (ILRT) as well as Type B and C Local Leak Rate Testing (LLRT). The Inservice Inspection Program: Containment Inspections credits only the Type A ILRT and Type B LLRT to manage the effects of aging identified in the NUREG-1 801 program element, Detection of Aging Effects.
>
> Program Elements Affected
> Scope of Program
> "This program element identifies three types of leak rate testing (Type A, B and C) as defined by 10 CFR 50, Appendix J. The Inservice Inspection Program: Containment Inspections utilizes only the Type A integrated leak rate testing and Type B local teak rate tests to manage the effects of aging."

On the basis that the exception, as revised by the supplement letter, credits both Types A and B testing for management of aging effects for license renewal, the staff finds this exception to be acceptable.

Operating Experience. The staff reviewed operating experience for the applicant's inservice inspection program: containment inspections program. The applicant stated in the LRA that operating experience indicates that the inspection and corrective action activities have successfully maintained the integrity of in-scope components. Any degradation of the containment found during inspections has been noted and corrected, as necessary, to preclude adverse effects on plant safety and operability.

On the basis of its review of the above operating experience, the staff concludes that the inservice inspection program: containment inspections adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.16 of the MPS Unit 2 LRA and Appendix A, Section A2.1.15 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the inservice inspection program: containment inspections. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.12 Inservice Inspection Program: Reactor Vessel Internals

Summary of Technical Information the application. The applicant's inservice inspection program: reactor vessel internals is described in LRA Section B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with exceptions and an enhancement, with GALL AMPs XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.M16, "PWR Vessel Internals."

The applicant stated in the LRA that the inservice inspection program: reactor vessel internals manages the aging effects of loss of material, cracking, loss-of-preload, change in dimension, and loss of fracture toughness (which presents itself as cracking due to embrittlement) through the use of inspections. The stainless steel and nickel-based alloy internals components susceptible to stress corrosion cracking, irradiation-assisted stress corrosion cracking, primary water stress corrosion cracking, void swelling, fretting wear, stress relaxation, and neutron irradiation embrittlement that support the intended function of the reactor vessel in a passive manner are in scope for this AMP. Reactor vessel internals components made from cast austenitic stainless steel (CASS) are in scope for this program and additionally are susceptible to thermal aging embrittlement. The inclusion of CASS components precludes the need for susceptibility screening (based on casting method, molybdenum content, and ferrite content) to determine applicability of the identified aging mechanisms. The reactor vessel internals components that are in scope for this AMP include the interior of the reactor vessel, integrally welded core support structure and interior attachments to the reactor vessel, and removable core support structures. Examinations conducted under the inservice inspection program: reactor vessel internals include inservice inspections performed in accordance with ASME Section XI, Class 1, examination categories B-N-1, B-N-2, and B-N-3 for accessible reactor vessel internals surfaces, and augmented examinations not required by ASME Section XI.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the exceptions and the applicant's justifications for the exceptions and enhancement to determine whether the AMP remains adequate to manage the aging effects for which it is credited. The staff's evaluation of the exceptions taken by the applicant in the program for the reactor vessel internals program is given in the paragraphs that follow.

Exceptions to NUREG-1801

Exception Number 1 in LRA, Section B2.1.17. In Appendix B2.1.17 of the LRA, the applicant took an exception to the staff's position recommending augmented examinations in addition to the current inspections required by the ISI program. Generally, the staff's positions in Sections X1.M12, X1.M13, and X1.M16 of NUREG-1801, is to use enhanced volumetric examinations, enhanced visual VT-1 examinations or perform a plant-specific or component-specific flaw tolerance evaluations.

The applicant stated that it will not perform these augmented inspections, but will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), stress corrosion cracking (PWSCC and IASCC), and loss of pre-load for baffle and former-assembly bolts and will implement the appropriate recommendations resulting from this guidance. The EPRI MRP's activities include the issues of thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (changes in dimensions), and stress corrosion cracking (PWSCC and IASCC) for the in-scope components. In addition, the issue of loss of pre-load for baffle and former assembly bolts for Millstone Unit 3 will also be addressed by the EPRI MRP activities. Millstone Unit 2 is a Combustion Engineering design and therefore the aging management of the baffle and former assembly bolts are not applicable. The applicant will implement these appropriate recommendations and is identified as Commitment 13 in Appendix A, Table A6.0-1 of the LRA.

Since it has been adopted in NUREG-1801, use of industry (EPRI MRP) research studies and activities on age-related degradation of PWR RV internal components may be used as an alternative basis for determining which age-related degradation mechanisms are applicable to PWR RV internals and what types of examinations are necessary to manage these mechanisms. This is a process-oriented approach to aging management that will ensure that the inspections proposed for PWR RV internals are those that the industry research studies have demonstrated are necessary to maintain the structural integrity or functionality of the components. NRC review of the recommended activities is an integral part of the industry initiative process.

Therefore, any proposal to use the industry's research studies and activities on RV internals as the basis for aging management should be coupled with: (1) a formal commitment to submit the inspection plans for the RV internals to the NRC for review and approval no later than three years prior to the period of extended operation, and (2) including this commitment in the Millstone Units 2 and 3 LRAs commitment tracking system. The staff addressed this in RAI B2.1.17-1(1) and B2.1.17-1(2).

In response to RAI B2.1.17-1(1) in a letter dated December 3, 2004, the applicant provided the following:

> The LRAs for Millstone Units 2 and 3 (Appendix A, Table A6.0-1, commitment 13) identify that Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling, stress corrosion cracking (PWSCC and IASCC), and for the Millstone Unit 3 commitment only, loss of pre-load for the baffle and former-assembly bolts. Dominion provided a supplemental response applicable to commitment 13 for both Millstone Unit 2 and 3 as

documented in the Dominion letter (Serial Number 04-320) dated July 7, 2004, (Audit Item Number 6). The supplemental response letter identifies the statement, “The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval,” should be inserted at the end of the [current] commitment. Appendix A, Table A6.0-1 for both the Unit 2 LRA and the Unit 3 LRA already states that commitment 13 is scheduled to be completed prior to the period of extended operation. The supplemental response letter also identifies the other applicable locations in both the Unit 2 LRA and the Unit 3 LRA where this additional wording should be inserted.

The staff found this commitment unacceptable since the applicant had not specifically committed to submit the program two years prior to the period of extended operation in order for the NRC to review and approve the program prior to its implementation at the facility during the period of extended operation. Therefore, the applicant was requested to revise commitment 13 of Appendix A, Table A6.0-1 of the Millstone Units 2 and 3 LRAs to state that the revised program implementing the industry efforts on reactor vessel internals will be submitted to the NRC for approval “two years” prior to the period of extended operation.

In response to supplemental RAI B2.1.17-1(1) in a letter dated February 8, 2005, the applicant has revised commitment 13 of Appendix A, Table A6.0-1 of the Millstone Units 2 and 3 LRAs to state that the revised program implementing the industry efforts on reactor vessel internals will be submitted to the NRC for approval two years prior to entering the period of extended operation. This commitment is acceptable to the staff. This resolves RAI B2.1-17(1).

In response to RAI B2.1.17-1(2) in a letter dated December 3, 2004, the applicant stated that commitment 13 in LRAs for Millstone Unit 2 and 3 will be included in the commitment tracking system, as is done for all new licensing commitments. Since the applicant confirmed that the commitment will be included in the commitment tracking system, the staff finds the proposal to use the industry’s research studies and activities on RV internals acceptable for implementing into their aging management program and to be submitted to the NRC for approval prior to entering the extended period of operation. This resolves RAI B2.1.17-1(2).

Exception Number 2 in LRA, Section B2.1.17. The applicant’s second exception to NUREG-1801, is the use of ASME Section XI, 1989 Edition with no addenda in lieu of the 1995 Edition with the 1996 Addenda recommended by GALL AMP XI.M16. However, both editions identify the same inspections (VT-3) for the applicable ASME Section XI examination requirements for Category B-N-3 PWR internals. Therefore, since the inspections are the same, the use of ASME Section XI, 1989 Edition with no addenda in lieu of the 1995 Edition with the 1996 Addenda is acceptable to the staff for the PWR vessel internals. It should be noted that these inspections will be augmented by the industry recommendations guidelines that will be implemented prior to entering the extended period as discussed above.

Enhancement to NUREG-1801. NUREG-1801, Section IVB2.1-d identifies the use of the ASME Section XI Inservice Inspection AMP to manage loss of preload for the core barrel holddown spring. The applicant proposed an enhancement to the core barrel holddown spring inspection. Specifically, the augmented inspection of the Millstone Unit 3 core barrel holddown spring will be performed to detect gross indication of loss of preload. However, in order for the staff to determine whether this is an enhancement to the current requirements, the staff required the applicant to provide the type of inspections to be performed, the inspection frequency and the acceptance criteria to justify that these inspections will be will be effective in managing the aging effects specified in Table 3.1.2-2 of the LRA for the holddown springs. This was addressed in RAI B2.1.17-2.

In response to RAI B2.1.17-2, in a letter dated December 3, 2004, the applicant stated that the exact examination method, acceptance criteria and frequency of inspections are in the process of being determined. Currently, commitment 14 of Table A6.0-1 of the Millstone Unit 3 LRA states that the proposed inspection will detect gross indication of loss of preload as an aging effect and be performed prior to the period of extended operation. However, the applicant has stated that as an alternative to performing an augmented inspection, the holddown spring may be replaced prior to the period of extended operation. Therefore, the applicant will include the following statement in commitment 14 of the Millstone Unit 3 LRA, "As an alternative to performing an augmented inspection, the holddown spring will be replaced prior to the period of extended operation." Since the proposed augmented inspection has not be developed or approved, the staff requests the applicant to commit to submit this inspection plan to the NRC for approval two years prior to entering the extend period or commit to replace the holddown springs two years prior to entering the extended period.

In response to supplemental RAI B2.1.17-1(2) in a letter dated February 8, 2005, the applicant has revised commitment 14 of Appendix A, Table A6.0-1 of the Millstone Units 3 LRA to state that as an alternative to performing an augmented inspection, the holddown spring will be replaced at least two years prior to entering the period of extended operation. This commitment is acceptable to the staff. This resolves RAI B2.1.17-2.

The staff also requested in RAI B2.1.17-1(3), that the applicant include loss of preload in List of Commitments, Table A6.0-1 in Appendix A of the Millstone Units 2 and 3 LRA to fully describe all of the necessary aging effects and their management. In response to RAI B2.1.17-1(3) in a letter dated December 3, 2004, the applicant stated that for both Millstone Units 2 and 3, loss of pre-load is an applicable aging effect that is managed by the inservice inspection program: reactor vessel internals program for bolting used in the reactor vessel. The Millstone Unit 3 LRA (Appendix A, Table A6.0-1, commitment 13) identifies that Millstone Unit 3 will follow the industry efforts on the loss of pre-load for the baffle and former assembly bolts. This is applicable to Millstone Unit 3 only since Millstone Unit 2 is a Combustion Engineering design, and therefore the aging management of the baffle and former assembly bolts is not applicable. The staff finds this acceptable since the bolting in the reactor vessel internals for Millstone Units 2 and 3 will be inspected in accordance with the ASME Code, Section XI, and the baffle and former assembly bolts in Millstone Unit 3 will have augmented inspections performed. This augmented inspection will be based on industry efforts and will be submitted to the NRC for approval prior to entering the period of extended operation. Since the proposed augmented inspection had not be developed or approved, the staff requested the applicant to commit to submit this inspection plan to the NRC for approval three years prior to entering the period of extended operation.

In response to supplemental RAI B2.1.17-1(3) in a letter dated February 8, 2005, the applicant has revised Commitment 13 of Appendix A, Table A6.0-1 of the Millstone Unit 3 LRA to state that the revised program implementing the industry efforts on reactor vessel internals, including the augmented inspection of the baffle and former bolts, will be submitted to the NRC for approval two years prior to entering the period of extended operation. This commitment is acceptable to the staff. This resolves RAI B2.1.17-1(3).

NUREG-1801, Sections IVB2.1k, IVB2.5-I, and IVB2.5-h, recommends loss of preload to be managed by the AMP XI.M1, “ASME Section XI Inservice Inspection,” which correlates to the applicant’s AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” The applicant stated that AMP B2.1.17, “Reactor Vessel Internals,” will be used to manage loss of preload/stress relaxation for the clevis insert bolts, upper support column bolts and the lower support plate column bolts. However, the applicant’s AMP B2.2.17, has no requirement for these bolts. The applicant was requested in RAI B2.1.18-4 to specify the correct AMP as recommended by NUREG-1801 or provide the necessary information in AMP B2.1.17.

In response to RAI B2.1.18-4 in a letter dated December 3, 2004, the applicant stated that the inservice inspection program: reactor vessel internals, AMP B2.1.17 includes the requirements for examination category B-N-3 of the ASME Code, Section XI, Subsection IWB.

Category B-N-3 of Table IWB-2500-1 of the ASME Code includes examination requirements for removable core support structures (i.e., reactor vessel internals) including the clevis insert bolts, the upper support column bolts, and the lower support plate column bolts. This is acceptable to the staff since these examinations are identical to the examinations recommended by GALL AMP XI.M1, “ASME Section XI Inservice Inspection,” which correlates to the applicant’s AMP B2.1.18 for these components. Therefore, RAI B2.1.18-4 is resolved.

Operating Experience. The staff reviewed operating experience for the applicant’s inservice inspection program: reactor vessel internals program. The review indicated that this program is in compliance with the inspection requirements of ASME Section XI and has identified no issues related to age degradation of in-scope reactor vessel internals components.

On the basis of its review of the above operating experience the staff concludes that the inservice inspection program: reactor vessel internals adequately manages the aging effects that have been observed at the applicant’s plant.

FSAR Supplement. In Appendix A, Section A2.1.17 of the MPS Unit 2 LRA and Appendix A, Section A2.1.16 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the inservice inspection program: reactor vessel internals. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant’s program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications, and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. Also, the staff has reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.13 Inservice Inspection Program: Systems, Components and Supports

Summary of Technical Information in the Application. The applicant's inservice inspection program: systems, components and supports is described in LRA Section B2.1.18, "Inservice Inspection Program: Systems, Components & Supports." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with exceptions, with GALL AMPs XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD," XI.M3, "Reactor Head Closure Studs," XI.M11, "Ni-Alloy Nozzles and Penetrations," XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," and XI.S3, "ASME Section XI Inservice Inspection, Subsection IWF."

The applicant stated in the LRA that the inservice inspection program: systems, components, and supports is an existing program that was developed to comply with the requirements of ASME Section XI. The ASME Code provides the requirements for inservice inspection, repair, and replacement of all Class 1, 2, and 3 components and associated component supports. For license renewal, the applicant credits managing the effects of aging for only Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the AMR process), and for Class 1, 2, and 3 component supports. The applicant's program manages the aging effects of cracking, loss of fracture toughness, loss of material, and loss of preload.

The applicant stated in the LRA that the program addresses the inservice inspection requirements for reactor vessel closure bolting, including those associated with detection of aging effects and those associated with performing the preventive measures presented in Regulatory Guide 1.65, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion," dated March 1997.

ISG-12, "Addition of Generic Aging Lessons Learned (GALL) Aging Management Program (AMP) XI.M35, 'One-Time Inspection of Small-Bore Piping,' for License Renewal," dated November 3, 2003, addresses cracking of small-bore Class 1 piping as a result of thermal fatigue or stress corrosion cracking. ISG-12 states that for plants that have not experienced cracking of small-bore Class 1 piping, a one-time inspection is an acceptable method to confirm that these aging effects are not occurring. However, if a plant has experienced cracking in small-bore Class 1 piping resulting from these aging effects, periodic inspections may be necessary as a plant-specific AMP. The applicant stated that although cracking of small-bore Class 1 piping from thermal fatigue or stress corrosion cracking has not been a problem, it has included small-bore piping in the Units 2 and 3 risk-informed inservice inspection (RI-ISI) programs. Based on risk significance (determined by an evaluation of the consequence of failure) and on the probability of failure; a volumetric, surface, or VT-2 visual examination is performed for specific small-bore pipe welds and base metal areas as defined in the unit-specific RI-ISI inspection plans. These examination methods detect cracking and leakage resulting from thermal fatigue, cyclic loading, stress corrosion cracking, and primary water stress corrosion cracking.

Industry programs are currently investigating aging effects applicable to nickel-based alloys (i.e., primary water stress corrosion cracking in Alloy 600 base metal and Alloy 82/182 weld metals) and are attempting to identify appropriate aging management activities to manage these aging effects. The applicant stated in the LRA that it will follow these industry efforts and will implement the appropriate recommendations resulting from this guidance. This commitment is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 14, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 15.

The applicant stated in the LRA that for potentially susceptible CASS materials, either enhanced volumetric examinations or a unit- or component-specific flaw tolerance evaluation (considering reduced fracture toughness and unit-specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness.

The applicant stated in the LRA that as a result of NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors," dated July 26, 1988, Unit 3 actively manages incore thimble tube degradation through performance of eddy current testing during each outage.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the exceptions and their justifications to determine whether the AMP, with the exceptions, remains adequate to manage the aging effects for which it is credited.

The applicant describes the reactor head closure stud program in LRA Section B2.1.18, "Inservice Inspection Program: Systems, Components and Supports." The applicant's discussion in LRA Section B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," indicates that the inservice inspection program incorporates program attributes from GALL AMPs XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD;" XI.M3, "Reactor Head Closure Studs;" AMP XI.M11, "Nickel Alloy Nozzles and Penetrations;" XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS);" and XI.S3, "ASME Section XI, Subsection IWF," and include discussions on thimble tube inspection and mechanical nozzle seal assemblies.

The applicant stated in the LRA that the ASME Class 2 and Class 3 components that are not in the scope of this AMP will continue to be inspected during the period of extended operation as part of the ASME Section XI inservice inspection program. However, the staff noted that the applicant has opted to use other appropriate preventive and condition monitoring programs, such as the general condition monitoring, to manage the effects of aging for these components.

The applicant stated that this program is an existing program that is consistent with the GALL Report, with exceptions that will be discussed in the evaluation below. This AMP will be reviewed in subsections that correspond to the incorporated NUREG-1801 AMPs discussed above to determine if they are consistent and provide the necessary information to manage the appropriate aging effects such that there is reasonable assurance that their intended functions will be maintained.

ASME Section XI Inservice Inspection (GALL AMP XI.M1)

Staff Evaluation. The applicant describes the ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD program in LRA Section B2.1.18, "Inservice Inspection Program: Systems, Components and Supports." The aging effects that are managed by this AMP include cracking, loss of fracture toughness, loss of material, and loss of pre-load. This AMP is an existing program that was developed to comply with the requirements of Section XI of the ASME Boiler and Pressure Vessel Code. The ASME program provides the requirements for ISI, repair, and replacement of all Class 1, 2, and 3 components and the associated component supports. For license renewal, the Millstone program has been credited to manage the effects of aging for Class 1, specific Class 2 components, and the Class 1, 2, and 3 component supports. The applicant stated that this program is consistent with GALL AMP XI.M1, with exceptions.

Exception Number 1: XI.M1 – Risk-Informed Inservice Inspection

GALL AMP XI.M1 does not currently recognize risk informed - inservice inspection (RI-ISI) programs as an alternative to the current ASME Section XI inservice inspection requirements. Millstone Unit 2 has submitted a request to implement a RI-ISI program by letter dated November 10, 2003. The Unit 3 RI-ISI program was approved by the staff by letter dated March 12, 2002. The RI-ISI program is applicable to the nondestructive examination (NDE) requirements for ASME Section XI Examination Category B-F and B-J welds and, for Unit 3 only, base metal locations. (Note: The RI-ISI analysis performed at Millstone Unit 2 identified no base metal locations that were considered to be potentially susceptible to thermal fatigue.) For these locations, examination requirements are determined on a component-specific basis. Pressure tests and VT-2 visual examinations shall continue to be performed as currently required by the Code. While the number of examinations is reduced, the risk from implementation of this program is expected to slightly decrease when compared to that estimated from the current requirements. The primary basis for the risk reduction is that examinations will be required for safety significant piping segments, which may not be currently inspected per the existing ASME Section XI program. In addition, the RI-ISI program is a living program that requires updating and expansion based on industry and site specific inspection findings. At present, a RI-ISI program is approved for use on an ASME Code 10-year ISI interval specific basis. Therefore, the applicant will have to request approval to use the RI-ISI program for the specific intervals during the period of extended operation in accordance with the appropriate ASME Code of record for the fifth and sixth ISI intervals, as referenced in 10 CFR 50.55a twelve months prior to each interval. Therefore, the staff finds that the ASME Code Section XI, as referenced in 10 CFR 50.55a, twelve months prior to each inspection interval of extended operation, as modified by a staff approved or authorized RI-ISI program, is acceptable for the period of extended operation.

Since the V.C. Summer main coolant loop weld cracking event involving Alloy 82/182 weld material, the staff has considered the effect of primary water stress-corrosion cracking on Alloy 82/182 piping welds as an operating plant issue affecting all piping. To resolve this issue, the industry has taken the initiative to (1) develop overall inspection and evaluation guidance, (2) assess the current inspection technology, and (3) assess the current repair and mitigation technology. An interim industry report, “PWR Materials Reliability Project Interim Alloy 600 Safety Assessment for US PWR Plants (MRP-44), Part 1: Alloy 82/182 Pipe Butt Welds,” was published in April 2001 to justify the continued operation of PWRs while the industry completes the development of the final report. The staff accepted this interim report in an SE dated June 14, 2001, stating that, “Should the industry not be timely in resolving inspection capabilities to identify PWSCC in Alloy 600 welds, regulatory action may result.” These industry initiatives and/or regulatory requirements will supersede the RI-ISI program requirements for dissimilar metal welds.

The inservice inspection program: systems, components and supports also takes exception to the “scope of the program,” “parameters monitored/inspected,” “detection of aging effects,” and “monitoring and trending” program elements such that for the Units 2 and 3 Class 1 examination category B-F and B-J type welds and, for Unit 3 only, base metal locations, inspection, examination, and additional examination requirements have been developed on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses. For the program elements associated with the second exception taken by the applicant, the GALL Report, in GALL AMP XI.M1, stated that the program element refers to ASME Section XI, Table IWB-2500-1 for the identification of examination and inspection requirements for Class 1 components. The examination methods are based on the requirements in ASME Section XI, Table IWB-2500-1 for Class 1 components. The inspection extent and frequency are based on IWB-2500, which provides for timely detection of degradation for Class 1 components. Indications during examination which exceed acceptance standards are to be extended to include additional examinations in accordance with IWB-2430 for Class 1 components.

The applicant stated in the LRA that Unit 2 has submitted a request to implement an RI-ISI program and Unit 3 has received approval from the NRC to implement an RI-ISI program. The process of developing the scope for the RI-ISI programs includes not only an evaluation of risk significance and failure probability, but also considers operating experience. RI-ISI implementation will reduce the risk and failure probability. The inspection and examination requirements, examination methods, and inspection extent and frequency are determined on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses. The staff reviewed the Unit 3 RI-ISI program plan, and determined that the reduction in risk provides sufficient justification for this exception.

Reactor Head Closure Studs Program (GALL AMP XI.M3)

Staff Evaluation. The applicant describes the Reactor Head Closure Stud program in LRA Section B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” The aging effects that are managed by this AMP include cracking, loss of fracture toughness, loss of material and loss of pre-load. This AMP addresses the inservice inspection requirements for the reactor vessel closure bolting, including inservice inspection to detect aging effects and preventive measures of Regulatory Guide 1.65, “Materials and Inspections for Reactor Vessel Closure Studs,” to mitigate cracking. The applicant stated that this program is consistent with GALL AMP XI.M3 with some exceptions, discussed in the evaluation below (Section 3.1.2.3.3.2 of this SER).

Exception Number 3 in LRA, Section B2.1.18. The applicant stated that Millstone Unit 3 complies with ASME Code Section XI, 1989 Edition with no addenda. GALL AMP XI.M3 describes a reactor head closure stud program that is, in part, based upon the 1995 Edition of the Code through the 1996 addenda. The 1995 Edition of the ASME Code through the 1996 addenda requires a visual (VT-1) examination of the closure head studs. The 1989 Edition to the ASME Code with no addenda requires a surface examination (e.g., magnetic particle, or liquid penetrant). Therefore, the Millstone Unit 3 inservice inspection plan specifies a surface examination (e.g., magnetic particle, or liquid penetrant) in accordance with the requirements of the 1989 ASME Code Edition in lieu of a visual (VT-1) examination of the surface of the closure head nuts. The examination method for nuts used in other Class 1 components, such as steam generators, pressurizer, heat exchangers, piping, pumps and valves, has always been a VT-1 visual examination. Therefore, the 1995 Edition of the Code through the 1996 addenda is consistent with the examination method used for the other Class 1 components. The 1995 Edition of the Code through the 1996 addenda also included a more detailed acceptance standard for the VT-1 visual examination, thereby making the visual examination comparable to the surface examination. Therefore, the surface examination is comparable to the visual examinations required by the later editions of the ASME Code. In addition, the surface examination is a well-qualified examination method that is widely used to detect cracking in ASME Code components and therefore, the staff finds the use of the surface inspection to the ASME Code Section XI, 1989 Edition with no addenda acceptable.

Exception Number 4 in LRA, Section B2.1.18. The applicant stated that the closure studs at Millstone Unit 2 are consistent with the recommendations of Regulatory Guide 1.65, except that the material requirements used for the corresponding nuts and washers are in accordance with ASTM A540, Grade B-23 in lieu of ASME SA 540, Grade B-23 material identified in Regulatory Guide 1.65. Based on the review of these material specifications, the materials chemical and mechanical properties are the same. Therefore, the staff finds this exception to be acceptable since it uses material similar to the regulatory guide requirements.

In addition, Section B2.1.18 of the LRA stated that Millstone Unit 2 complies with ASME Code Section XI, 1989 Edition with no addenda. GALL AMP XI.M3 describes a reactor head closure stud program that is, in part, based upon the 1995 Edition of the Code through the 1996 addenda which requires a visual (VT-1) examination on the surfaces of the closure head nuts. Although Millstone Unit 2 complies with the 1989 Edition of the ASME Code, relief was granted from performing the surface examination of the nuts as required by the 1989 Edition. Thus, Millstone Unit 2 performs a visual examination. This is acceptable to the staff in that this is the inspection identified by GALL AMP XI.M3 and the 1995 Edition of ASME Code through the 1996 Addenda. Therefore, the applicant is performing the inspections as required by the ASME Code to manage the aging effects of the closure studs, nuts and washers.

NUREG-1801 indicates that reactor head closure studs are susceptible to loss of material due to wear and to crack initiation and growth due to stress corrosion cracking (SCC). GALL recommends Chapter XI.M3, “Reactor Head Closure Studs” program as a program acceptable for mitigating and monitoring these aging effects. This program relies on ASME Code Section XI, Subsection IWB to monitor and detect this aging effects. Preventive measures identified in the GALL program include avoiding the use of metal-plated stud bolting to prevent degradation due to corrosion or hydrogen embrittlement and using manganese phosphate or other acceptable surface treatments and stable lubricants (RG 1.65). In RAI B2.1.18-5, the staff requested that the applicant provide the operating experience of the reactor vessel closure studs, including the use of coatings or lubrication, and what degradation, if any, that was found during these inspections with the corresponding corrective actions.

In response to RAI B2.1.18-5 in a letter dated December 3, 2004, the applicant provided the following:

> Millstone Unit 2 uses ASME SA 540, Grade B-24 as the material for the vessel studs, with a manganese phosphate coating on the studs. ASTM A 540, Grade B-23 material is used for the reactor vessel closure nuts and washers, and “parkerizing” (manganese phosphate) is the specified coating. The bolting is lubricated at installation with Fel-Pro-N-5000, a nickel-based, anti-seize lubricant, which can be used in applications with a dry surface temperature as high as 2400 °F.
>
> For Millstone Unit 3, the reactor vessel closure bolting is fabricated from ASME SA-540 material. The closure studs are Grade B-24 material and the nuts and washers are Grade B-23 material. A phosphate coating is applied to the bolting. In accordance with a design modification, the threaded portions of the studs

> have a PlasmaBond coating applied in lieu of the original phosphate coating. PlasmaBond is a Nickel-Silver/Palladium coating using a vapor deposition process that eliminates the potential for hydrogen embrittlement. This newer anti-galling coating was added to provide for lubrication, and has no adverse metallurgical interactions. This coating is fully endorsed by Westinghouse for use on vessel head closure studs. Application of Fel-Pro-N-5000 is not needed when vessel closure studs have been PlasmaBond coated.
>
> As recommended by Regulatory Guide 1.65, plugs are installed in the empty stud hole cavities following stud removal during refueling for both Millstone Unit 2 and 3 in order to provide protection against contamination and corrosion. Nondestructive examinations are performed to comply with the requirements of ASME Section XI, Subsection IWB. To date, no age related degradation has been identified for the vessel closure bolting for either Millstone Unit.

For Millstone Unit 2, the applicant follows the recommendations of RG 1.65. However, for Millstone Unit 3, the staff notes that the response to RAI B2.1.18-5 stated that the closure bolting for Unit 3 uses Plasma Bond coating (Nickel-Silver/Palladium). RG 1.65 stated that silver plated studs had severe galling and severe corrosion damage in the thread roots of the studs at LaCrosse (BWR) and Yankee Rowe. Therefore, in accordance with RG 1.65, section C.1.b(3), the applicant should demonstrate that the plating will not degrade the quality of the material in any significant way (e.g., corrosion, H2 embrittlement) or reduce the quality of results attainable by the various required inspection procedures.

In response to supplemental RAI B2.1.18-5 in a letter dated February 8, 2005, the applicant stated that the use of PlasmaBond coating was applied to the threaded portions of the studs as an alternative to the phosphate coating. The PlasmaBond coating was developed and tested by the Millstone Unit 3 NSSS vendor (Westinghouse) for use on vessel head closure studs and other locations such as steam generator manway studs. This newer anti-galling coating was added to provide for enhanced lubrication. The coating has no adverse metallurgical interactions and will not affect the base metal physical properties. The applicant also stated that industry experience includes the use of the PlasmaBond coating for reactor vessel studs at Comanche Peak, Units 1 and 2, Catawba Unit 2, Beaver Valley Units 1 and 2, and Seabrook without any issues. Comanche Peak has had the most operating experience with PlasmaBond, which included six operating cycles without any degradation of the studs due to the PlasmaBond coating. In addition, Millstone Unit 3 has inspected the closure studs with the PlasmaBond coating and found no indications from the volumetric or magnetic particle examinations performed during their inservice inspection program.

PlasmaBond is a Nickel-Silver/Palladium coating that uses a vapor deposition process in lieu of an electrolytic process. Therefore, there is no hydrogen generation and no potential for hydrogen embrittlement of the fastener. The applicant also stated that this improved anti-galling coating is an approved coating recommended by Westinghouse and does not increase corrosion attack or introduce any new material degradation mechanisms. The PlasmaBond coating process precludes degradation due to hydrogen embrittlement, has no effect on ultrasonic, magnetic particle, or dye penetrant inspection techniques, and will not mask any defects. The staff finds this response acceptable since it addressed the requirements of RG 1.65, and demonstrated that this coating does not degrade the quality of the material through mechanisms such as corrosion or hydrogen embrittlement or reduce the quality of the required inspection. This resolves RAI B2.1.18-5.

NUREG-1801, Sections IVB2.1k, IVB2.5-I, and IVB2.5-h, recommends loss of preload to be managed by the AMP XI.M1, "ASME Section XI Inservice Inspection," which correlates to the applicant's AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports." The applicant stated that AMP B2.1.17, "Reactor Vessel Internals," will be used to manage loss of preload/stress relaxation for the clevis insert bolts, upper support column bolts and the lower support plate column bolts. This issue was discussed and resolved in Section 3.0.3.2.1 of this SER.

Nickel Alloy Nozzles and Penetrations (GALL AMP XI.M11)

Summary of Technical Information. In Section B2.1.18 of Appendix B of the LRA, the applicant addressed Nickel Alloy Nozzles and Penetrations and stated it is consistent with NUREG 1801, Section XI.M11 with an exception.

Exception Number 6: XI.M11 – Reactor Vessel Top Head Inspections

GALL AMP XI.M11 references the development of an industry wide integrated, long-term inspection program based on industry responses to Generic Letter (GL) 97-01 as contained in NEI correspondence. However, since the issuance of GL 97-01, significant operating experience has been gained and corresponding staff guidance has been issued to better characterize and address the PWSCC of nickel alloys issue.

In response to the more recent staff guidance such as NRC Bulletins 2002-01 and 2002-02, Millstone Unit 2 has performed vessel top head examinations during its most recent refueling outages to assess the overall condition of the reactor vessel head. The head inspections are further discussed in the "Operating Experience" section of this program.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the nickel alloy nozzles and penetration program to determine if the program demonstrates that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.

The staff's original basis for inspection nickel-based reactor vessel head (RVH) penetration nozzles in U.S. PWRs is provided in GL 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Head Penetrations," issued on April 1, 1997. Between November 2000 and April 2001, reactor coolant pressure boundary leakage was identified from the RVH penetration nozzles of four U.S. PWR-designed light water reactor facilities. Supplemental examinations of the degraded nozzles indicated the presence of circumferential cracks in four of the RVH nozzles. These cracks initiated from the outer surface of the nozzle, either in the associated J-groove weld or heat-affected-zone, and not from the inside surface of the nozzle, as was assumed in the industry responses to NRC GL 97-01. These cracks penetrated through the nozzles and were identified as circumferential cracking. In NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," issued on August 3, 2001, the staff discussed the generic safety significance and impacts of these cracks on RVH penetration nozzles and recommended that enhanced visual examinations or volumetric examination methods be used for the inspection of RVH nozzles.

In March 2002, during a refueling outage at the Davis-Besse Nuclear Power Station, the licensee for the plant reported the occurrence of reactor coolant leakage from RVH penetration nozzles. As a result of follow-up evaluations of the reactor coolant leakage, the licensee reported that the leakage resulted in significant boric-acid-related wastage of the RVH. The wastage affected the entire thickness of the RVH with the exception of the RVH cladding (stainless steel). On March 18, 2002, the NRC issued NRC Bulletin 2002-01, “Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity,” to owners of PWR designed plants, requesting that EH licensee’s address the impact of the Davis-Besse event on the structural integrity of their RVHs and associated penetration nozzles. On August 9, 2002, the staff issued NRC Bulletin 2002-02, “Reactor Vessel Head and Vessel Head Penetration Nozzle Inspection Programs,” to address additional technical issues resulting from the Davis-Besse event. In NRC Bulletin 2002-02, the staff specifically suggested that further augmented inspections, more comprehensive than those suggested in NRC Bulletin 2001-01, be performed on RVH penetration nozzles. On February 11, 2003, the staff issued Order EA-03-009, “Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors,” to further define to the licensee’s the frequency and extent of inspection of the RPV head nozzles. On August 21, 2003, the staff issued NRC Bulletin 2003-02, “Leakage form Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity,” to advise licensee’s that RPV lower head inspections may need to be supplemented with additional measures to assure that the RCPB leakage is detected. On February 20, 2004, the staff issued First Revised Order EA-03-009, to modify the inspection requirements for reactor pressure vessel heads at pressurized water reactors.

The applicant stated that Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. This commitment is identified in Appendix A of the LRA, Table A6.0-1 License Renewal Commitments, Item 14 for Unit 2 and Item 15 for Unit 3.

In RAI B2.1.18-1 the staff requested that the applicant modify its commitment to state that the aging management activities to monitor the aging effects of nickel-based alloys will be submitted three years prior to the period of extended operation in order for the staff review and approval to determine if the program demonstrates the ability to manage the effects of aging in nickel-based components per 10 CFR 50.54.21(a)(3). In addition, the applicant needs to address how nickel-based components will be evaluated in terms of susceptibility to PWSCC.

The applicant, by letter dated December 3, 2004, modified its commitment to submit its program prior to the period of extended operation for staff review and approval. The applicant’s response did not meet with the staff’s request to submit the program three years prior to the period of extended operation to allow the staff time to review and approve the program. This was identified as Confirmatory Item B2.1.18-3.

In response to Confirmatory Item B2.1.18-3, in a letter dated April 1, 2005, the applicant stated that in LRA Appendix A “FSAR Supplement,” Sections A2.1.18 and A2.1.22 for Unit 2 and Sections A2.1.27 and A2.1.21 for Unit 3, the commitment to follow industry efforts regarding nickel-based alloys has been modified to read:

> The revised program description will be submitted at least two years prior to the period of extended operation for staff review and approval to determine if the program

> demonstrates the ability to manage the effects of aging in nickel-based components per 10 CFR 54.21(a)(3).

Additionally, the schedule for Table A6.0-1, Commitment 14 (Unit 2) and 15 (Unit 3), in LRA Appendix A will be changed to:

> At Least Two Years Prior to the Period of Extended Operation.

Based on this revised commitment, Confirmatory Item B2.1.18-3 is closed.

Thermal Aging Embrittlement of CASS (GALL AMP XI.M12)

Summary of Technical Information in the Application. In Section B2.1.18 of Appendix B of the LRA, the applicant stated that the AMP "Inservice Inspection Program: Systems, Components and Supports" is consistent with the NUREG 1801 AMP XI.M12, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS).

Staff Evaluation. The applicant stated in Section B2.1.18 of Appendix B of the LRA that the potential for thermal aging embrittlement of CASS components is addressed through the performance of plant-specific or component-specific evaluations in accordance with Section XI.M12 of NUREG-1801, to assess whether the material has adequate fracture toughness. This is consistent with the NUREG-1801 screening for susceptibility to thermal aging embrittlement of CASS piping. NUREG-1801 does not require additional inspections beyond those required by the ASME Code for pump casings and valve bodies and the ASME Code Case N-481 for pump casings. If CASS piping is not susceptible, then no additional inspections are required. However, susceptible CASS piping is required to be inspected by an enhanced volumetric examination to detect and size cracks. Therefore, the applicant was requested in RAI B2.1.18-6 to update the AMP to include the necessary inspections recommended by NUREG-1801 for CASS piping that are found to be susceptible (inadequate fracture toughness).

In response to RAI B2.1.18-6 in a letter dated December 3, 2004, the applicant stated that the following information will be added to the inservice inspection program: systems, components and supports aging management program (AMP B2.1.18) to assure that the necessary inspections will be performed for CASS piping that are found to be susceptible to thermal aging embrittlement:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit specific flaw tolerance evaluation considering reduction in fracture toughness and using specific geometry and stress information will be used to demonstrate that the thermally embrittled material has adequate toughness in accordance with NUREG-1801, Section XI.M12, April 2001. This commitment is identified in the FSAR Supplement, Table A6.0-1 License Renewal Commitments, Item 27 for Unit 2 and Item 28 for Unit 3.

The staff finds this response acceptable because the applicant has included the necessary management for thermal aging embrittlement of CASS components by an enhanced volumetric examination or a plant-specific flaw evaluation as recommended by NUREG -1801, Section XI.M12. This resolves RAI B2.1.18-6.

ASME Section XI, Subsection IWF (GALL AMP XI.S3)

Staff Evaluation. GALL AMP XI.S3 recommends specific percentages of Class 1, 2, and 3 ASME Section XI, Subsection IWF supports to be examined at each inspection interval that are based on later editions of the ASME Code than that used to develop the MPS inservice inspection program. When asked by the staff to justify the use of the earlier edition of the Code, the applicant stated that the percentages of MPS Units 2 and 3 Subsection IWF supports examined by the MPS AMP are based on ASME Code Case N-491-1 (Table -2500-1), which establishes the same percentages as those in the later editions of the Code and acceptable in the GALL Report. The applicant stated in the MPS LRA, that ASME Code Case N-491 was used to obtain a relief request for IWF supports examinations. The staff reviewed the applicant's internal document and identified that ASME Code Case N-491-1 was used to obtain a relief request. To clarify this, the applicant submitted an MPS LRA supplement letter, dated July 7, 2004, which stated that the revision for the referenced ASME Code Case, "N-491" should be replaced with "N-491-1" in MPS Unit 2 and Unit 3 Appendix B, Section B2.1.18 (page B-76). The staff finds this to be acceptable.

Thimble Tube Inspection

The staff's regulatory basis for establishment of the applicant's the Flux detector thimble inspection program is given in NRC Bulletin (BL) 88-09, Thimble Tube Thinning in Westinghouse Reactors [July 26, 1988], which was addressed to all holders of operating licenses or construction permits for Westinghouse-designed nuclear reactors that utilize bottom mounted instrumentation nozzles. In this Bulletin, the staff requested, in part, that each licensee addressed by the Bulletin establish an inspection program for flux detector thimble tubes (henceforth referred to as "thimble tubes") with the following program attributes:

(1) The establishment, with technical justification, of an appropriate thimble tube wear acceptance criteria (for example, based on percent through-wall loss). The staff recommended that the acceptance criteria include allowances for such items as inspection methodology and wear scar geometry uncertainties.

(2) The establishment, with technical justification, of an appropriate inspection frequency (for example, every refueling outage).

(3) The establishment of an inspection methodology that is capable of adequately detecting wear of the thimble tubes (such as eddy current testing).

Summary of Technical Information in the Application In Section B2.1.18 of Appendix B of the LRA, the applicant stated that as a result of NRC Bulletin 88-09, Millstone Unit 3 actively manages incore thimble tube degradation through performance of eddy current testing during each refueling cycle.

Staff Evaluation. In LRA Section B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," the applicant specified eddy current inspections to manage the integrity of the incore neutron monitoring thimble tubes, which serve as a portion of the reactor coolant pressure boundary. As discussed in NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors," July 26, 1988, thimble tube wall-thinning can occur as a result of flow-induced vibration. This wear damage is detected at locations associated with geometric discontinuities or area changes along the reactor coolant flow path, such as areas near the lower core plate, the core support forging, the lower tie plate, and the vessel penetrations.

To determine the acceptability of this AMP, as recommended by NUREG-1801, Section IV B2.6-c, the acceptance criterion, with technical justification, (e.g., percent through-wall loss, and wear scar geometry uncertainty) needed to be submitted to the staff. In addition, the applicant was requested in RAI B2.1.18-8 to provide the scope (the number of total tubes and the percent of the tubes inspected) of the eddy current inspections. The NRC staff also asked that the operating experience of the thimble tubes be provided.

In response to RAI B2.1.18-8 in a letter dated December 3, 2004, the applicant provided the following:

> The structural acceptance criterion for the Millstone Unit 3 BMI flux thimble tubes is 80 percent wall thinning, as determined by current and previous readings conservatively projected to the time of the next inspection. The 80% acceptance figure includes significant margins against structural failure, and is based on evaluations and testing documented in Westinghouse proprietary report WCAP-12866, "Bottom Mounted Instrumentation Flux Thimble Wear," dated January 1991. Thimbles that do not meet the acceptance standards are either capped or replaced. The eddy current calibration standard includes the most severe wear scar geometries, such that readings of actual flaws with less severe geometry are conservative. Therefore no adjustment for postulated wear scar geometry is required. Although the WCAP states that " ...it is not necessary to add additional uncertainty margin to the eddy current wall loss indications...," an instrument uncertainty of 3% is assumed. This value is conservative based on the scatter in data observed at Millstone for the highly worn thimbles.
>
> There are a total of 58 BMI flux thimble tubes and currently 100% inspection is performed each outage. The frequency of future inspections may be adjusted, for example, if highly worn tubes are replaced with wear resistant material and the remaining thimbles can be shown to meet acceptance criteria for multiple cycles. To date, fourteen BMI flux thimble tubes have been repositioned and four have been capped because they might not have met the acceptance criterion prior to the next inspection.

The applicant's response demonstrates that the applicant is taking acceptable corrective actions for thimble tubes that are projected to wear beyond the acceptance criterion prior to the next inspection. Since the applicant is using the Millstone Unit 3 eddy current test (ECT) results to project the amount of wear occurring in the Millstone Unit 3 thimble tubes, and since the applicant is taking acceptable corrective action for thimbles tubes that are unacceptable for further service, the staff concludes that the inspection of the Millstone Unit 3 thimble tubes every refueling outage is acceptable.

In NRC BL 88-09, the staff requested each licensee "to establish an inspection program to monitor thimble tube performance, that includes the establishment, with technical justification, of an appropriate thimble tube wear acceptance criterion (for example, percent through-wall loss)."

The staff reviewed Proprietary WCAP-12866 and determined that the acceptance criterion in the topical report was based on conservative burst tests on Westinghouse thimble tube designs that support an 80 percent through-wall acceptance criterion for the thimble tubes at Millstone Unit 3. This value includes an additional safety margin established by Westinghouse for allowable wear in the thimble tube. This safety margin, however, does not include an allowance for instrument uncertainties, which, as a percentage of the wall thickness, must be accounted for by either adding it to the eddy current testing (ECT) wear result data or subtracting it from the acceptance criterion.

As indicated in its response to RAI B1.1.18-8 discussed above, the applicant accounted for the instrument uncertainties of three percent in its wear assessments for the thimble tubes by adding the instrument uncertainties to wall measurement data after the ECT examinations have been performed. This is acceptable. The staff concludes that the applicant's 80 percent through-wall acceptance criterion is acceptable because it is based on conservative burst tests for the thimble tubes and because it includes an acceptable safety margin on allowable wear. Therefore, the staff concludes the acceptance criteria for the flux thimble inspection program is acceptable and RAI B2.1.18-8 is resolved.

Table 3.1.2-1 of the Millstone Unit 3 LRA identified the BMI Flux Thimble Tubes and BMI guide tubes as being susceptible to cracking from SCC. The aging management programs for cracking of the BMI flux thimble tubes and BMI guide tubes includes water chemistry and AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports" of the LRA. However, the thimble tube inspections were initially designed to inspect for wear in the thimble tubes and NUREG-1801, Section IVB2.6-a recommends the use of the PWR Vessel Internals AMP to manage cracking in the guide tubes. Details of these inspections including scope, examination method, acceptance criteria, and examination frequencies were not included in AMP B2.1.18 of the LRA. Since the OD surface of the thimble tubes is exposed to the same environment as the ID surface of the guide tube and both components are fabricated from stainless steel they would both be susceptible to SCC. Therefore, the staff requested in RAI B2.1.18-3 that the applicant provide the types of inspections that will be performed to manage cracking in the thimble and guide tubes, along with a discussion on why these types of inspections, their frequency and inspection criteria will be effective in managing cracking. Operating experience of cracking in these tubes and any resulting replacements was also to be provided.

In response to RAI B2.1.18-3 in a letter dated December 3, 2004, the applicant provided the following:

> Although the thimble tubes are inserted into the core, the BMI Flux Thimble Tubes and the BMI Guide Tubes identified in Unit 3 LRA Table 3.1.2-1 are not reactor vessel internals component[s] and the inservice inspection program: reactor vessel internals AMP is not applicable for management of the associated aging effects for these components.
>
> The BMI flux thimble tubes (corresponding to NUREG-1801 item IV.B2.6.2) are the in-core flux detector thimble tubes and are the subcomponents that are inserted and extracted from the core area through the 58 reactor vessel bottom head penetrations. The 5/16" OD BMI flux thimble tubes are exposed to the reactor coolant pressure externally and are loaded in compression in service. This compressive load combined with the small surface area does not result in a significant stress component for SCC to occur in the BMI flux thimble tubes. However, cracking due to SCC has been conservatively applied as an aging effect to the BMI flux thimble tubes. Aging management for cracking is provided by the chemistry control for primary systems program AMP in order to minimize potential contaminants. Additional aging

management is provided by crediting the existing inspection of the seal table pressure boundary during each refueling outage via the inservice inspection program: systems, components, and supports AMP.

The BMI guide tubes (no corresponding NUREG-1801 item) are the guide tubes in which the BMI flux thimble tube travels. The stainless steel BMI guide tubes extend from the seal table to the nickel-based alloy instrument tubes that are attached to the reactor vessel bottom head. This configuration results in a significant temperature reduction in the BMI guide tubes from RCS operating temperature, which greatly reduces susceptibility of the stainless steel material to SCC. Based on service temperature, the most susceptible location for cracking due to SCC in the BMI tubes is the interface weld between the BMI guide tubes and the [Instrumentation Tubes (bottom head)] in Table 3.1.2-1. This weld is inspected as part of the inservice inspection program: systems, components, and supports AMP and provides a leading indicator for BMI guide tube cracking. The reduced temperature, along with control of contaminants provided by the chemistry control for primary systems program AMP, reduces the potential for stress corrosion cracking of the BMI guide tubes.

There have been no instances of cracking found in the Millstone Unit 3 BMI flux thimble tubes or the BMI guide tubes.

The applicant's response credits the water chemistry AMP for controlling contaminants to reduce the potential of stress corrosion cracking in the flux thimble tubes and the guide tubes. For the flux thimble tubes, the applicant also credits the existing inspection of the seal table pressure boundary during each refueling outage in accordance with their inservice inspection program. In supplemental RAI B2.1.18-3(1), the staff requested the applicant specify the type of inspection (i.e. visual inspection or ultrasonic).

In its response to supplemental RAI B2.1.18-3(1) dated February 8, 2005, the applicant stated that a VT-2 examination is performed during the system leakage test performed at normal operating temperature and pressure in accordance with Examination Category B-P of the ASME Code, Section XI, Subsection IWB, during each refueling outage. The acceptance criteria for the examination is no signs of leakage, and any indications of leakage would be evaluated through the plant-specific corrective action system. The applicant also stated that operating experience related to the thimble tubes at Millstone Unit 3 has identified no occurrences of SCC. In addition, there is no known operating experience with SCC of thimble tubes having occurred in the nuclear industry. Based on the plant-specific and industry experience, the staff agrees that a VT-2 examination every refueling outage is sufficient to monitor cracking in these components. This resolves RAI B2.1.18-3(1).

For the guide tubes, the applicant credits the water chemistry AMP for reducing the potential for stress corrosion cracking and the inservice inspection program: systems, components, and supports AMP for inspecting the most susceptible location to stress corrosion cracking, which is the weld between the BMI guide tubes and instrumentation tubes on the reactor vessel bottom head, in Table 3.1.2-1 of the LRA. To determine if the inspections of the inservice inspection AMP is capable of managing SCC in the guide tubes the applicant was requested to address the following:

- Specify the type of inspection or the inspection frequency.

- In addition, if indications in this weld are found, what increase in the sampling will be performed since this is being used as an indicator that SCC is occurring?
- Also, the applicant stated that the reduced temperature from that of the RCS operating temperature reduces the potential for SCC. What temperatures do the Guide Tubes experience?
- Generic Letter 88-01 indicates that at temperatures below 200 °F stainless steel components are not susceptible to SCC. If the temperature of the guide tubes is above 200 °F, the potential for SCC is not reduced, and the applicant was requested to determine whether the inspection frequency is acceptable to detect cracking of the guide tube.

In its response to supplemental RAI B2.1.18-3(2) dated February 8, 2005, the applicant stated that to confirm that the water chemistry program is effective in mitigating SCC, a VT-2 examination during the system leakage test in accordance with the ASME Code Section XI, Subsection IWB, is performed every refueling outage. In addition, the BMI guide tubes are welded to the instrumentation tubes which penetrate and are welded to the reactor vessel bottom head. Therefore, the Instrumentation Tubes are more susceptible to SCC due to the higher operating temperature than the BMI guide tubes. The instrumentation tubes then become a leading indicator of SCC. The aging of the Instrumentation Tubes is managed the inservice inspection program: systems, components, and supports AMP. The applicant also committed to perform a 360-degree bare metal visual examination of all 58 penetrations during each refueling outage, as documented in Dominion letter S/N 03-459A dated November 17, 2003, that responded to the NRC Bulletin 2003-02. The acceptance criterion is no evidence of leakage. Any indications of leakage would be evaluated through the corrective action system. Leakage in this area would result in further examinations, including the BMI guide tubes, to determine the extent of the condition. he applicant also reviewed their operating experience, and found no occurrences of SCC at the BMI guide tubes. The staff finds that the applicant conservatively applied SCC as an aging effect for the BMI guide tubes, based on the operating experience that has identified no occurrences of SCC. In addition, the applicant has provided an inspection program to manage SCC in the BMI guide tubes. This resolves RAI B2.1.18-3(2).

Mechanical Nozzle Seal Assemblies (MNSA)

<u>Summary of Technical Information in the Application</u> In Appendix B, AMP B2.1.3 of the LRA, the applicant stated that nickel-based pressurizer heater penetrations for Millstone Unit 2, two penetrations were found to show evidence of leakage. A design change was generated to address the issue by installing mechanical nozzle seal assembly (MNSA) clamps on the leaking heater penetrations to prevent leaking.

<u>Staff Evaluation</u>. Table 3.1.2-3 of the LRA specified AMP B2.1.18, inservice inspection program, to manage cracking of the nickel-based pressurizer heater sheathes and sleeves. However, AMP B2.1.18 did not provide specific information on these components. In addition, Appendix B, AMP B2.1.3 of the LRA stated that during ISI visual inspection of the nickel-based pressurizer heater penetrations for Millstone Unit 2, two penetrations were found to show evidence of leakage. A design change was generated to address the issue by installing MNSA clamps on the leaking heater penetrations to prevent leaking. However, MNSAs are currently not considered long-term repairs, in particular for the extended period of operation, without providing justification which includes an analysis of the pressure boundary component and an

inservice inspection program to be maintained throughout the licensed life of the plant. As stated in NRC letter dated December 8, 2003, to the Westinghouse Owners Group, the analysis and inservice inspection program required NRC approval. Therefore, in RAI B2.1.18-7 the applicant was requested to provide the information, set forth in the December 8, 2003, letter to justify the continued approval of the MNSAs for the period of extended operation. This information was also to include corrective actions, such as weld repairs, half-nozzle repairs or pressurizer replacements that may be performed in the future to eliminate the MNSAs. The applicant was requested to include this information in AMP B2.1.18 which manages cracking of the pressurizer penetrations.

In response to RAI B2.1.18-7 in a letter dated December 3, 2004, the applicant stated Dominion intends to replace the pressurizer during the fall of 2006 refueling outage for Millstone Unit 2 using materials that are resistant to PWSCC, as documented in its letter dated June 3, 2004. To track this commitment, the applicant was requested to revise the List of Commitments (Table A6.0-1 of Appendix A to the Millstone Unit 2 LRA) to include the commitment that the Millstone Unit 2 pressurizer will be replaced in fall 2006 with material resistant to PWSCC (i.e. Alloy 690 and 52/152).

In response to supplemental RAI B2.1.18-8 in a letter dated February 8, 2005, the applicant added Commitment Item 36 to the Millstone Unit 2 LRA, Appendix A, FSAR Supplement, Table A6.0-1 which states that Dominion will replace the Millstone Unit 2 pressurizer using materials that are more resistant to PWSCC prior to entering the extended period of operation. This commitment is acceptable to the staff and resolves RAI B2.1.18-1.

Operating Experience. The staff reviewed operating experience for the applicant's inservice inspection program: systems, components, and supports. The applicant stated in the LRA that the program identifies examples to demonstrate how the portions of the inservice inspection program related to GALL AMPs XI.M1 and XI.S3 are adequate to manage the aging effects during the extended period of operation. These examples were considered during the staff's evaluation of this AMP.

The applicant stated in the LRA that the portion of the inservice inspection program related to GALL AMP XI.M12 is new and will be implemented prior to the period of extended operation. The applicant stated in the LRA that no plant-specific operating experience exists for thermal aging embrittlement of CASS. The applicant also stated in the LRA that its program for thermal aging embrittlement of CASS was developed using research data obtained on both laboratory-aged and service-aged materials.

On the basis of its review of the above operating experience, the staff concludes that the inservice inspection program: systems, components and supports adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.18 of the MPS Unit 2 LRA and Appendix A, Section A2.1.17 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the inservice inspection program: systems, components and supports. The staff reviewed these sections and the information provided by the LRA supplements, dated July 7, 2004, and December 3, 2004, and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.14 Inspection Activities: Load Handling Cranes and Devices

Summary of Technical Information in the Application. The applicant's inspection activities: load handling cranes and devices program is described in LRA Section B2.1.19, "Inspection Activities: Load Handling Cranes and Devices Program." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with enhancements, with GALL AMP XI.M23, "Inspection of Overhead Heavy Load (Related to Refueling) Handling Systems."

The applicant stated in the LRA that the inspection activities: load handling cranes and devices program manages the aging effect of loss of material for the load handling cranes and devices within the scope of license renewal. The in-scope load handling cranes and devices are either safety-related or seismically designed to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

Load handling cranes and devices inspections address the overall condition of the crane or device, including checking the condition of the structural members (i.e., rails, girders, etc.) and fasteners on the crane or device, the runways along which the crane or device moves, and the base plates and anchorages for the runways and monorails.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the enhancements and their justifications to determine whether the AMP, with the enhancements, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.19 of the LRA, the applicant stated that the inspection activities: load handling cranes and devices program will be consistent with GALL AMP XI.M23, with enhancements. The applicant stated that it will enhance the scope of program, program element to include those lifting devices that require monitoring for license renewal, but are not already included in the program. This enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 15, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 16. The applicant will also enhance the detection of aging effects program element to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal added by the first enhancement. This enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 16, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 17.

The staff noted that the inspection activities: load handling cranes and devices program does not currently include all lifting devices required for license renewal. The applicant has initiated followup items to ensure that this program will be modified to include those lifting devices required for license renewal but not already managed by the program. Although this enhancement comprises more than the list of items specifically identified in the scope for GALL AMP XI.M23, the staff determined that this enhancement will bring the applicant's program into agreement with the intent of the GALL AMP XI.M23 program element. On this basis, the staff finds the first enhancement to be acceptable.

The staff noted that the AMP's implementing procedures and documentation do not currently provide all of the inspection criteria required to manage aging effects for lifting devices. The applicant has initiated followup items to ensure that the applicant's lifting and handling program implementing procedures and/or automated work orders are modified, or new ones created, to provide the required structural inspection guidance for monitoring the effects of aging. Evidence of aging effects that are potentially adverse to quality are entered into the corrective action program.

The staff finds that the applicant's proposed changes to the implementing procedures and documentation for the inspection criteria will ensure that degradation of the lifting devices will be identified before there is a loss of intended function. On this basis, the staff finds this enhancement to be acceptable since it will bring the applicant's program into agreement with the GALL Report.

Operating Experience. The staff reviewed operating experience for the applicant's inspection activities: load handling cranes and devices program. The review indicated the inspection activities: load handling cranes and devices program is effective in identifying and implementing repairs, and maintaining the integrity of load handling cranes and devices.

The applicant stated in the LRA that during the operating history of MPS, anomalous conditions with cranes and lifting devices have been identified. These anomalies have included principally administrative or operational issues. None of these issues has resulted from age-related degradation and they are not a concern associated with license renewal. However, in the few instances where inspection results have indicated signs of potential degradation, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

On the basis of its review of the above operating experience, the staff concludes that the inspection activities: load handling cranes and devices program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.19 of the MPS Unit 2 LRA and Appendix A, Section A2.1.18 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the inspection activities: load handling cranes and devices program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.15 Service Water System (Open-Cycle Cooling)

Summary of Technical Information in the Application. The applicant's service water system (open-cycle cooling) program is described in LRA Section B2.1.21, "Service Water System (Open-Cycle Cooling)." In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with three exceptions, with GALL AMP XI.M20, "Open-Cycle Cooling Water System."

The applicant stated, in the LRA, that the service water systems for Units 2 and 3 are open-cycle, once-through cooling systems that are subject to the requirements of GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 1989. The applicant uses the surveillance and control techniques recommended by GL 89-13 to manage the effects of aging on the service water systems. The program addresses the aging effects of corrosion (including MIC), erosion, protective coating failure, silting, and biofouling of service water piping and components.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation are documented in the MPS audit and review report. Furthermore, the staff reviewed the exceptions and their justifications to determine whether the AMP, with the exceptions, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.21 of the LRA, the applicant stated that the service water system (open-cycle cooling) program will be consistent with GALL AMP XI.M20, with exceptions. The service water system (open-cycle cooling) program takes exception to the "scope of program," "detection of aging effects," and "monitoring and trending" program elements in that (1) Unit 2 relies on frequent, regular inspection and cleaning of heat exchangers, in lieu of thermal performance testing as recommended by the GALL Report. Fouling determinations are made based on established differential pressure limits (fixed or derived from curves) under maximum service water flow conditions.

The staff determined that frequent, regular inspection and cleaning is allowed by GL 89-13 and meets the intent of the GALL Report for ensuring that heat exchangers are capable of performing their intended function of heat transfer during the period of extended operation. On the basis of a review of GL 89-13 and interviews with the applicant’s technical staff, the staff determined that this exception is consistent with the CLB and therefore finds this first exception to be acceptable.

The service water system (open-cycle cooling) program also takes exception to the “scope of program,” “detection of aging effects,” and “monitoring and trending” program elements such that (2) the Unit 3 reactor plant component cooling system heat exchangers and containment recirculation coolers are not testable. For the program element associated with the exception taken by the applicant, the GALL Report states that thermal performance testing is an effective method for assessing the effects of aging on heat exchangers. The staff determined that the containment recirculation coolers are maintained in a dry lay-up condition and the service water supply to these heat exchangers is flushed on a semi-annual basis, greatly reducing the possibility of biofouling and potential reduction in heat transfer rate. The reactor plant component cooling system heat exchangers are cleaned on the tube side and inspected annually. As with the other service water heat exchangers, trending and assessments of biofouling are performed for the reactor plant component cooling system heat exchangers to detect the presence of macro-fouling, and the necessary actions are taken to preclude fouling and reduction in heat transfer rate. On the basis of a review of GL 89-13 and interviews with the applicant’s technical staff, the staff determined that this exception is consistent with the CLB and therefore finds the second exception to be acceptable.

The service water system (open-cycle cooling) program also takes exception to the “preventive actions” program element in that, generally, (3) the Unit 3 redundant cooling loops for the service water system are rotated into service on a regular basis; therefore, flushing and testing requirements do not apply. The only exceptions are the Unit 3 containment recirculation coolers and the service water supply piping to these heat exchangers. For the program element associated with the exception taken by the applicant, the GALL Report discusses flushing and testing requirements in accordance with GL 89-13 for "infrequently used cooling loops.”

The staff agrees with the applicant’s statement in the LRA that because the containment recirculation coolers are maintained in a dry lay-up condition, no mechanism exists for tube-side fouling and the ability of the coolers to perform their intended function is maintained. The applicant stated in the LRA that the service water supply piping to these heat exchangers is flushed on a semi-annual basis. On the basis of a review of GL 89-13 and interviews with the applicant’s technical staff, the staff determined that this exception is consistent with the CLB and therefore finds the third exception to be acceptable.

Operating Experience. The staff reviewed the operating experience for the applicant’s service water system (open-cycle cooling) program. The applicant stated in the LRA that repairs and design changes have been implemented to replace degraded portions of the service water systems. Continuing adherence to existing service water system inspection and testing procedures provides reasonable assurance that deficiencies will be identified and corrected so that the service water components remain capable of performing their intended functions.

On the basis of its review of the above operating experience, the staff concludes that the service water system (open-cycle cooling) program adequately manages the aging effects that have been observed at the applicant’s plant.

FSAR Supplement. In Appendix A, Section A2.1.21 of the MPS Unit 2 LRA and Appendix A, Section A2.1.20 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the service water system (open-cycle cooling) program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant’s program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.16 Structures Monitoring Program

Summary of Technical Information in the Application. The applicant’s structures monitoring program is described in LRA Section B2.1.23, “Structures Monitoring Program.” In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with enhancements, with GALL AMPs XI.S5, “Masonry Wall Program,” XI.S6, “Structures Monitoring Program,” and XI.S7 “RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants.”

The applicant stated in the LRA that the structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties. The applicant’s program monitors those structures and structural support systems that are within the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65, as addressed in NRC Regulatory Guide (RG) 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2, dated March 1997, and NUMARC 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2, dated April 1996. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures in the scope of license renewal (such as non-safety-related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function.

The applicant stated in the LRA that the scope of the structures monitoring program includes all masonry walls and water-control structures identified as performing intended functions in accordance with 10 CFR 54.4.

The applicant stated in the LRA that the structures monitoring program does not include the inspection of the supports specifically inspected per the requirements of the inservice inspection program: systems, components, and supports program, or inspection of the structural condition of the hangers and supports incorporated into the general condition monitoring program.

The applicant stated in the LRA that the structures monitoring program takes no credit for coatings applied to external surfaces of structural members in the determination of the aging effects for the underlying materials. The structures monitoring program does, however, evaluate the condition of the coatings as an indication of the condition of the underlying materials.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the enhancements and their justifications to determine whether the AMP, with five enhancements, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.23 of the LRA, the applicant stated that the structures monitoring program will be consistent with GALL AMPs XI.S5, "Masonry Wall Program," XI.S6, "Structures Monitoring Program," and XI.S7, "RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants," with enhancements. The applicant stated that it will enhance the "parameters monitored/inspected," "detection of aging effects," and "acceptance criteria" program elements such that program (1) procedures will be revised to include American Concrete Institute (ACI) Standard 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures," dated 1996, and American Nuclear Standards Institute/American Society of Chemical Engineers (ANSI/ASCE) Standard 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," dated 1990, as references and input documents for the inspection program. This is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 17, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 18.

The staff reviewed the applicant's technical document in which the applicant stated that it will revise program procedures to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and input documents for the structures monitoring program. The existing program procedures generally follow the recommendations of ACI 349.3R-96 and ANSI/ASCE 11-90. However, these two documents were not specifically used or referenced in the development of the current program procedures. The applicant stated in the LRA that these revisions will be initiated prior to the period of extended operation. This enhancement will bring the applicant's program into agreement with the GALL AMP XI.S6 program elements. The staff finds the first enhancement to be acceptable.

The applicant also stated that it will enhance the "scope of program," program element such that (2) the implementing engineering procedures will be modified to include all additional structures inspections required for license renewal. This is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 18, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 19. The applicant's structures monitoring program does not currently monitor all structures required for license renewal. In addition, the applicant stated, as documented in the staff's MPS audit and review report for the structures monitoring program, that the structures monitoring program does not currently identify certain types of structural members (concrete beams, columns, etc.) and structural components (flood barriers, stairs, sumps, etc.) that are subject to inspection. In order to ensure that all in-scope structural members and components are addressed, the program procedures shall be further clarified and enhanced so that all in-scope structural members and components are identified. The applicant stated in the LRA that the procedures will be revised prior to the period of extended operation. This enhancement will bring the applicant's program into agreement with the GALL AMP XI.S6 program element. The staff finds the second enhancement to be acceptable.

The applicant also stated that it will enhance the “parameters monitored/inspected” and “detection of aging effects” program elements such that (3) additional groundwater samples will be taken to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. The staff reviewed the applicant’s structures monitoring program, as documented in the its MPS audit and review report, in which the applicant stated that groundwater samples will be collected to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. Also, the applicant stated that additional samples need to be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not of a nature that could cause the below-grade concrete to degrade. This is identified on the applicant’s license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 19, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 20. The applicant stated in the LRA that the samples will be taken prior to the period of extended operation. This enhancement will bring the applicant’s program into agreement with the GALL AMP XI.S6 program elements. The staff finds the third enhancement to be acceptable.

In addition, the applicant stated that it will enhance the “parameters monitored/inspected” program element such that (4) the structures monitoring program procedures will be modified so that the electrical engineering staff will be alerted if medium-voltage cables in scope of license renewal have been found to be exposed to significant moisture during structures inspections. This is identified on the applicant’s license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 20, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 21. The staff reviewed the applicant’s structures monitoring program, as documented in the staff’s MPS audit and review report, in which that applicant stated that the structures monitoring program procedures will be modified so that the electrical engineering staff will be alerted if, during structures inspections, in-scope medium-voltage cables are found to have been exposed to significant moisture. Water intrusion can occur within the in-scope structures due to groundwater in-leakage or leakage of a plant system. The applicant stated in the LRA that the procedures will be revised prior to the period of extended operation. This enhancement will bring the applicant’s program into agreement with the GALL AMP XI.S6 program element. The staff finds the fourth enhancement to be acceptable.

The applicant will also enhance the “parameters monitored/inspected” program element such that (5) the maintenance and work control procedures will be revised to take advantage of inspection opportunities for structures required for license renewal and identified as “inaccessible.” This is identified on the applicant’s license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 21, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 22. The staff reviewed the applicant’s, as documented in the staff’s MPS audit and review report for the structures monitoring program, in which the applicant stated that the maintenance and work control procedures will be revised to take advantage of inspection opportunities for structures required for license renewal and identified as “inaccessible.” As inaccessible areas become accessible by such means as excavation or installation of shielding or for any other reason, additional inspections of those areas will be performed. As determined by the corrective action program, engineering evaluation of the examination results will determine the need for any subsequent inspections. The applicant stated in the LRA that this enhancement will be implemented prior to the period of extended operation. This enhancement will bring the applicant’s program into agreement with the GALL AMP XI.S6 program element. The staff finds the fifth enhancement to be acceptable.

Operating Experience. The staff reviewed operating experience for the applicant’s structures monitoring program. The review indicated the structures monitoring program is effective in identifying structural degradation, implementing corrective actions, and trending the parameters. When degradation has been identified, corrective actions have been implemented to ensure that the integrity of the affected structure is maintained.

On the basis of its review of the above operating experience, the staff concludes that the structures monitoring program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.23 of the MPS Unit 2 LRA and Appendix A, Section A2.1.22 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the structures monitoring program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant’s program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.17 Tank Inspection Program

Summary of Technical Information in the Application. The applicant’s tank inspection program is described in LRA Section B2.1.24, “Tank Inspection Program.” In the LRA, the applicant stated that this is an existing MPS program. This program will be consistent, with enhancements, with GALL AMP XI.M29, “Aboveground Carbon Steel Tanks.”

The applicant stated in the LRA that the tank inspection program manages the aging effect of loss of material through periodic internal and external tank inspections. The program includes inspections of the sealant and caulking in and around the tank and concrete foundation, and evaluations to monitor the condition of coatings, linings, and structural elements to prevent deterioration of the tanks to unacceptable levels. The program also includes performance of volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms. The acceptance criterion for visual inspections of paint, coatings, sealant, caulking, and structural elements is the absence of anomalous indications that are signs of degradation. Thickness measurements of the tank walls and bottoms are evaluated against design thickness, established baseline values, or loss of material allowances.

Staff Evaluation. During its audit and review, the staff confirmed the applicant’s claim of consistency with the GALL Report. Details of the staff’s evaluation of the audit and review are documented in the audit and review report. Furthermore, the staff reviewed the enhancements and their justifications to determine whether the AMP, with three enhancements, remains adequate to manage the aging effects for which it is credited.

In Appendix B, Section B2.1.24 of the LRA, the applicant stated that the tank inspection program will be consistent with GALL AMP XI.M29, with enhancements. The applicant stated that it will enhance the "scope of the program," "parameters monitored/inspected," "detection of aging effects," and "acceptance criteria" program elements such that (1) inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks will be performed. This is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 22, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 23. For the program elements associated with the enhancement, the GALL Report states that the AMP consists of (a) preventive measures to mitigate corrosion by protecting the external surfaces of carbon steel tanks protected with paint or coatings and (b) periodic system walkdowns to manage the effects of corrosion on the intended function of these tanks. Plant walkdowns cover the entire outer surface of the tank up to its surface in contact with soil or concrete.

The GALL Report also states that the AMP utilizes periodic plant system walkdowns to monitor degradation of coatings, sealants, and caulking because it is a condition directly related to the potential loss of materials.

In addition, the GALL Report states that degradation of exterior carbon steel surfaces cannot occur without degradation of paint or coatings on the outer surface and of sealant and caulking at the interface between the component and concrete. Periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component.

The GALL Report also states that any degradation of paint, coating, sealant, and caulking is to be reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking, or missing sealant and caulking. Thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.

The staff reviewed the applicant's tank inspection program, as documented in the staff's MPS audit and review report, in which the applicant stated that it will perform appropriate inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks. The applicant stated in the LRA that these inspections will be initiated prior to the period of extended operation. This enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements. The staff finds the first enhancement to be acceptable.

The applicant stated that it will enhance the detection of aging effects, monitoring and tending, and acceptance criteria program elements in that (2) non-destructive volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal, will be performed. This is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 23, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 24. For the program elements associated with the enhancement, the GALL Report states that degradation of exterior carbon steel surfaces cannot occur without degradation of paint or coatings on the outer surface and of sealant and caulking at the interface between the component and concrete. Periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component. However, corrosion may occur at inaccessible locations, such as the tank bottom surface, and thickness measurement of the tank bottom is to be taken to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.

The GALL Report also states that the effects of corrosion on the aboveground external surface are detectable by visual techniques. Based on operating experience, plant system walkdowns during each outage provide for timely detection of aging effects. The effects of corrosion of the underground external surface are detectable by thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected.

In addition, the GALL Report states that any degradation of paint, coating, sealant, and caulking is reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking, or missing sealant and caulking. Thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.

The staff reviewed the tank inspection program, as documented in the staff's MPS audit and review report, in which the applicant stated that it will perform non-destructive volumetric examinations of inaccessible locations, such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal. The applicant stated in the LRA that these volumetric examinations will be performed prior to the period of extended operation and will be performed on a frequency consistent with scheduled tank internals inspection activities. This enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements. The staff finds the second enhancement to be acceptable.

Also, the applicant stated that it will enhance the "scope of program," program element such that (3) the Unit 2 security diesel fuel oil tank and the Unit 3 diesel fire pump fuel oil tank will be added to the list of in-scope components for this program. This is identified on the applicant's license renewal commitment list in the Unit 2 LRA, Appendix A, Table A6.0-1, Item 24, and the Unit 3 LRA, Appendix A, Table A6.0-1, Item 25. For the program element associated with the enhancement, the GALL Report states that the program consists of (a) preventive measures to mitigate corrosion by protecting the external surfaces of carbon steel tanks protected with paint or coatings and (b) periodic system walkdowns to manage the effects of corrosion on the intended function of these tanks.

The staff reviewed the tank inspection program, as documented in the staff's MPS audit and review report, in which the applicant stated that it will add the Unit 2 security diesel fuel oil tank and the Unit 3 diesel fire pump fuel oil tank to the list of in-scope tanks for the tank inspection program and will include the tanks on the respective inspection plans. Although these two tanks have been identified as in scope for license renewal, the applicant noted in the tank inspection program, as documented in the staff's MPS audit and review report, that the tanks are not currently identified on the respective tank inspection plans. This enhancement will bring the applicant's program into agreement with the GALL AMP XI.M29 program elements. The staff finds the third enhancement to be acceptable.

<u>Operating Experience</u>. The staff reviewed operating experience for the applicant's tank inspection program. The review indicated the tank inspection program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of aboveground tanks.

On the basis of its review of the above operating experience, the staff concludes that the tank inspection program adequately manages the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.24 of the MPS Unit 2 LRA and Appendix A, Section A2.1.23 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the tank inspection program. The staff reviewed these sections and determined that the information in the FSAR supplement provides an adequate summary of the program activities. The staff finds these sections of the FSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that those program elements for which the applicant claimed consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing aging management program being consistent with the GALL Report AMP to which it was compared. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.18 Bolting Integrity Program

Summary of Technical Information in the Application. The applicant added bolting integrity to the aging management programs of Appendix B of the LRA in RAI response 3.3.11-A-1 by letter dated December 3, 2004.

The bolting integrity program ensures that the effects of aging associated with the in-scope components will be adequately managed so that there is reasonable assurance that their intended functions will be maintained consistent with the current licensing basis throughout the period of extended operation.

Millstone good bolting practices are established in accordance with plant procedures. These procedures include requirements for proper disassembling, inspecting, and assembling of connections with threaded fasteners. The general practices that are established in this program are based on EPRI NP-5067 Volume 1, "Good Bolting Practices, A Reference for Nuclear Power Plant Maintenance Personnel, Volume 1: Large Bolt Manual," EPRI NP-5067, Volume 2, "Good Bolting Practices, A Reference for Nuclear Power Plant Maintenance Personnel, Volume 2: Small Bolts and Threaded Fasteners," and EPRI TR-104213, "Bolted Joint Maintenance and Applications Guide."

The bolting integrity program is an existing program that manages the aging effects of cracking, loss of material, and for ASME Class 1 bolting, loss of preload. The program includes the good bolting practices established for in scope threaded fasteners in plant procedures in accordance with recognized industry organizations such as EPRI and AISC. The program also includes the inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting. The applicant stated that the bolting integrity program is consistent with the aging management program described in Chapter XI of GALL AMP XI.M18, with the clarification and exceptions as described below:

Clarification Number 1: XI.M18 - Loss of Preload

GALL AMP XI.M18, identifies loss of preload as an aging effect requiring management for all bolting within the scope of license renewal. The applicant identifies loss of preload as an aging effect requiring management for ASME Class 1 bolting only. The applicant stated that the operating temperature for all in scope bolted connections other than Class 1 bolting are well below the threshold temperature at which stress relaxation of pressure boundary bolting would occur.

Exception 1: XI.M18 - Reference Documents

Documents referenced in NUREG-1801 for safety-related bolted connections are not directly referenced by the Millstone bolting integrity program. NUREG-1801 Section XI.M18 states that the program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in EPRI NP-5769 (with exceptions as noted in NUREG-1339) for safety-related bolting.

The procedures for ensuring bolting integrity at Millstone identify inspection requirements and general practices for in scope bolting that are consistent with the bolting recommendations identified in Section XI.M18, but do not directly reference EPRI NP-5769 or NUREG-1339 as applicable source documents for these recommendations. However, the Millstone procedures do reference and incorporate the good bolting practices identified in EPRI NP-5067. EPRI NP-5769 and EPRI NP-5067 are very closely related documents that cross-reference one another and reference NUREG-1339.

Exception 2: XI.M18 - Use of Different Code Year than Identified in NUREG-1801

GALL AMP XI.M18 identifies inservice inspection requirements in accordance with Table IWB-2500-1 and the 1995 Edition through the 1996 Addenda of ASME Section XI. The Millstone current ISI program is based on the 1989 Edition with no addenda. There are no differences between these Code years with respect to examination requirements for ASME Class 1, 2, and 3 bolting and their support bolting.

Staff Evaluation. The applicant added bolting integrity to the aging management programs of Appendix B of the LRA in RAI response 3.3.11-A-1, by letter dated December 3, 2004.

The bolting integrity program is an existing program that manages the aging effects of cracking, loss of material, and for ASME Class 1 bolting, loss of preload. The program includes the good bolting practices established for in scope threaded fasteners in plant procedures in accordance with recognized industry organizations such as EPRI and AISC. The program also includes the inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting. The applicant stated that the bolting integrity program is consistent with the aging management program described in GALL AMP XI.M18, with the clarification and exceptions as reviewed below:

Clarification Number 1: XI.M18 - Loss of Preload

The applicant stated that the operating temperature for all other in-scope bolted connections are well below the threshold temperature at which stress relaxation of pressure boundary bolting would occur. The staff found that other factors such as vibration can contribute to loss of preload. The applicant needed to address other factors which can contribute to loss of preload and justify if loss of preload is an aging effect requiring management for all bolting within the scope of license renewal. This was identified as Open Item 3.0.3.2.18-1.

In response to Open Item 3.0.3.2.18-1, dated July 14, 2005, the applicant stated the Millstone bolting integrity AMP has now been revised to manage loss of preload as an applicable aging effect for all in-scope bolting. Based on this change to the bolting integrity AMP, Open Item 3.0.3.2.18-1 is closed.

Exception 1: XI.M18 - Reference Documents

Documents referenced in NUREG-1801 for safety-related bolted connections are not directly referenced by the Millstone bolting integrity program. NUREG-1801 Section XI.M18 states that the program relies on recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in EPRI NP-5769 (with exceptions as noted in NUREG-1339) for safety-related bolting.

The procedures for ensuring bolting integrity at Millstone identify inspection requirements and general practices for in scope bolting that are consistent with the bolting recommendations identified in Section XI.M18, but do not directly reference EPRI NP-5769 or NUREG-1339 as applicable source documents for these recommendations. However, the Millstone procedures do reference and incorporate the good bolting practices identified in EPRI NP-5067. EPRI NP-5769 and EPRI NP-5067 are very closely related documents that cross-reference one another and reference NUREG-1339. The staff requested clarification on how the guidance in EPRI NP-5067 and EPRI TR-104213 meets the intent of EPRI NP-5769 and NUREG-1339 as identified in GALL AMP XI.M18. This was identified as Open Item 3.0.3.2.18-2.

By letter dated April 1, 2005, the applicant provided a comparison of EPRI NP-5769 and EPRI NP-5067 as they relate to the bolting integrity program at Millstone. In summary, the Millstone bolting integrity program is consistent with the recommendations in NUREG-1801, Section XI.M18. The comparison provided by the applicant demonstrates that EPRI NP-5067 provides adequate guidance for addressing the bolting integrity for Millstone Units 2 and 3. Therefore, Open Item 3.0.3.2.18-2 is closed.

Exception 2: XI.M18 - Use of Different Code Year than Identified in NUREG-1801

The current ISI program for Millstone is based on the 1989 Edition with no addenda of Section XI of the ASME Code. GALL AMP XI.M18 identifies inservice inspection requirements in accordance with Table IWB-2500-1 and the 1995 Edition through the 1996 Addenda of Section XI of the ASME Code.

The regulations require that inservice inspection of components be conducted during the first 10-year interval and subsequent intervals to comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, which was incorporated by referenced in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The current code of record for Millstone is the 1989 Edition with no Addenda of Section XI of the ASME Code. When NUREG-1801 was drafted the edition referenced in 10 CFR 50.55a(b) was the 1995 Edition through the 1996 Addenda of Section XI of the ASME Code. The editions and addenda of Section XI of the ASME Code that are referenced in 10 CFR 50.55a(b) have been reviewed and found acceptable, subject to the limitations and modifications listed therein. Therefore, the staff finds the use of the Code of Record (1989 Edition) for Millstone is acceptable. In addition, for the period of extended operation, the applicant will be required to update its Code of Record to the Edition and Addenda as referenced in 10 CFR 50.55a(b) twelve months prior to the start of each 120-month interval.

FSAR Supplement. The bolting integrity program corresponds to GALL AMP XI.M18, “Bolting Integrity.” The program manages the aging effects of cracking, loss of material, and, for Class 1 bolting, loss of preload.

The aging effects are managed by establishing good bolting practices in accordance with EPRI NP-5067 Volume 1, “Good Bolting Practices, A Reference for Nuclear Power Plant Maintenance Personnel, Volume 1: Large Bolt Manual,” EPRI NP-5067, Volume 2, “Good Bolting Practices, A Reference for Nuclear Power Plant Maintenance Personnel, Volume 2: Small Bolts and Threaded Fasteners,” and EPRI TR-104213, “Bolted Joint Maintenance and Applications Guide.”

In addition, ASME Class bolting is managed by the performance of inservice examinations in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF. Engineering evaluations determine if a component needs to be repaired/replaced or is acceptable for continued operation until the next scheduled inspection. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program. The corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

The staff found that the resolution of Open Items 3.0.3.2.18-1 and 3.0.3.2.18-2 may warrant a modification to the FSAR. This issue was identified as Confirmatory Item 3.0.3.2.18-1. By letter dated July 14, 2005, the applicant provided the revised FSAR sections to reflect resolution of Open Items related to the bolting integrity program. Based on these FSAR changes, Confirmatory Item 3.0.3.2.18-1 is closed.

Conclusion. Based on the information provided by the applicant, the staff finds that the effects of aging will be adequately managed by the bolting integrity program so that the intended functions will be maintained consistent with the CLB for the period of extended operation as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3 AMPs that are Not Consistent with or Not Addressed in the GALL

In Appendix B of the LRA, the applicant indicated that the following AMPs were plant-specific:

- battery rack inspections (B2.1.1)
- general condition monitoring (B2.1.13)
- infrequently accessed areas inspection program (B2.1.15)
- work control process (B2.1.25)

For AMPs that are not consistent with or not addressed by the GALL Report, the staff performed a complete review of the AMPs to determine if they were adequate to monitor or manage aging. The staff's review of these plant-specific AMPs is documented in the following sections of this SER:

3.0.3.3.1 Battery Rack Inspections

Summary of Technical Information in the Application. The applicant's battery rack inspections program is described in LRA Section B2.1.1, "Battery Rack Inspections." In the LRA, the applicant stated that this is an existing plant-specific program. The applicant credits this program with managing the aging effects for loss of material of such design elements as anchorages, bracing and supports, side and end rails, and spacers between battery cells. Potential degradation of the racks is evaluated for its effect on their structural integrity during a seismic event, and repairs are implemented as necessary.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Appendix B, Section B2.1.1, of the LRA, regarding the applicant's demonstration of the battery rack inspections program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the battery rack inspections program against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3, and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is provided separately in Section 3.0.4 of this SER. The remaining seven elements are discussed below:

(1) Scope of the Program - The applicant stated, in Appendix B, Section B2.1.1 of the LRA, that for this program element, the battery racks provide support and restraint for various batteries that supply power to equipment in the plant. The applicant stated that the battery racks for the following batteries are within the scope of license renewal for this program: Unit 2 main station batteries, Unit 2 non-safety-grade turbine battery, Unit 2 security diesel generator battery, Unit 3 main station batteries, Unit 3 non-safety-grade battery 5, Unit 3 diesel-driven fire pump batteries, Unit 3 station blackout diesel generator battery, and 345-kilovolt switchyard relaying and control batteries. Seismic design elements such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers between cells are included as part of this program.

The existing battery rack inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already in the program. The enhancement will be implemented prior to the period of extended operation. This commitment is also identified on the applicant's license renewal commitment list in the LRA, Appendix A, Table A6.0-1, Item 1. The staff finds this enhancement is required and is acceptable as any such changes will provide additional assurance that the effects of aging will be adequately managed.

The staff reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1 of the SRP-LR. The proposed scope, including the enhancements, identifies the specific components for which the program manages aging. On this basis, the staff finds that the applicant's proposed program scope is acceptable.

(2) Preventive Actions - The applicant stated, in Appendix B, Section B.2.1.1 of the LRA that this program element is not applicable because the battery rack inspection program is an inspection program and no actions will be taken as part of this program to prevent or mitigate aging degradation.

The staff confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The staff did not identify the need for preventive actions for this AMP because it is a condition monitoring program. Therefore, the staff finds this acceptable.

(3) Parameters Monitored or Inspected - The applicant stated, in Appendix B, Section B2.1.1 of the LRA that the battery support racks are visually inspected to ensure that their physical condition is not degraded (loss of material). Where installed, items such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers are also inspected.

The staff confirmed this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The battery rack inspection program is acceptable because the visual inspections for material loss are intended to detect the presence and extent of aging effects. On this basis, the staff finds that the parameters monitored or inspected program element is acceptable.

(4) Detection of Aging Effects - The applicant stated, in Appendix B, Section B2.1.1 of the LRA, that battery rack inspections are performed on a periodic basis. Visual inspections identify degradation of the support racks. These inspections include items such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers. These inspections check for loss of material (such as corrosion) of the support racks.

In the LRA the applicant also stated that implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance in the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 2.

The staff reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.4 of the SRP-LR. The detection of aging effects, including the enhancements, identifies the specific components for which the program manages aging. On this basis, the staff finds that the applicant's detection of aging effects program element is acceptable.

(5) Monitoring and Trending - The applicant stated, in Appendix B, Section B2.1.1 of the LRA, that battery rack inspections determine the extent of aging effects. The material condition of the battery racks is recorded. In accordance with inspection procedures and if acceptance criteria are not met, the corrective action program is employed to evaluate the issue and provide corrective actions in a timely manner. Engineering evaluations assess whether the extent of aging could cause a loss of intended function.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1 of the SRP-LR. Trending of inspection results will be performed and will enhance the applicant's ability to detect aging effects before there is a loss of intended function. On this basis, the staff finds that the applicant's monitoring and trending program element is acceptable.

(6) Acceptance Criteria - The applicant stated, in Appendix B, Section B2.1.1 of the LRA, that the acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Engineering evaluations determine whether observed deterioration of material condition is significant enough to compromise the ability of a battery rack to perform its intended function. Occurrence of degradation that is adverse to quality will be entered into the corrective action system.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated by an engineer to determine whether the observed deterioration of material condition is significant enough to compromise the ability of a battery rack to perform its intended function. If found unacceptable, corrective measures will be implemented. On this basis, the staff finds that the acceptance criteria program element is acceptable.

(7) Operating Experience - The applicant stated, in Appendix B, Section B2.1.1 of the LRA, that the inspections and corrective actions have been successful in maintaining battery support rack integrity. Incidents of battery rack corrosion have occurred and corrective action has been taken to repair or replace storage rack components as necessary. Periodic inspections of the support racks help ensure their continued integrity and proper functioning during routine operation, as well as during the limiting condition of a seismic event.

On the basis of its review of the above operating experience, the staff concludes that the battery rack inspections program will adequately manage the aging effects that have been observed at the applicant's plant.

<u>FSAR Supplement</u>. In Appendix A, Section A2.1.1 of the LRA, the applicant provided the FSAR supplements for the battery rack inspections program and stated that the program will manage the aging effect of loss material for the station battery support racks within the scope of license renewal. Visual inspections will be performed to ensure the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the applicant's corrective action program as part of the quality assurance program.

The staff reviewed the FSAR supplements and confirmed that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

<u>Conclusion</u>. On the basis of its review and audit of the applicant's program, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.2 General Condition Monitoring

Summary of Technical Information in the Application. The applicant's general condition monitoring program is described in LRA Section B2.1.13, "General Condition Monitoring." In the LRA, the applicant stated that this is an existing plant-specific program. The applicant credits this program with managing the aging effects for loss of material, cracking, and change of material properties on the external surfaces of components. The external surfaces of structures and components are monitored for signs of aging that can be detected via visual observations. General condition monitoring includes the observations that are made during focused inspections performed on a periodic basis for plant components and structures, including those within the scope of license renewal. The results of the monitoring activities provide the basis for initiating required corrective action in a timely manner.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Appendix B, Section B2.1.13, of the LRA, regarding the applicant's demonstration of the general condition monitoring program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the general condition monitoring program against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3, and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is provided separately in Section 3.0.4 of this SER. The remaining seven elements are discussed below.

(1) Scope of the Program - The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that the general condition monitoring program detects aging effects by visual inspections of the exterior surface of plant equipment, whether it is constructed of metal, concrete, or polymers.

    The staff reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1 of the SRP-LR. The proposed scope identifies the specific components for which the program manages aging. On this basis, the staff finds that the applicant's proposed program scope is acceptable.

(2) Preventive Actions -The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that the general condition monitoring program is an inspection program and no actions will be taken as part of this program to prevent or mitigate aging degradation.

    The staff confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The staff did not identify the need for preventive actions for the general condition monitoring program because it is a condition monitoring program.

(3) Parameters Monitored or Inspected - The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that system engineer walkdown inspections monitor the material

condition of plant systems, structures, and components during normal operation, shutdown conditions, and refueling outages. Inspectors look for the following types of degradation or adverse conditions during visual inspections: worn, flaking, or rusted painted surfaces; excessive rust, material wastage or signs of degradation, cracking or aging on equipment surfaces; leaks, including evidence of boric acid; damaged or degraded hangers and supports; signs of general corrosion on machined or sliding surfaces with close tolerances; signs of unusual concrete or grout deterioration, erosion, corrosion, chipping, cracking, or spalling on equipment foundations; and loose, corroded, stressed, seized, or rusted skids, foundations, supports, hangers, and fasteners.

During performance of radiologically controlled area surveys, health physics personnel look for evidence of boron precipitation and active radioactive system leaks.

During their rounds, plant equipment operators monitor the material condition of plant systems, structures, and components in all modes of operation. During visual inspections, plant equipment operators look for evidence of system leakage, including evidence of boric acid; evidence of groundwater intrusion or leakage; loose or missing pipe hangers; evidence of degradation (e.g., excessive corrosion or scaling); and signs of unusual concrete or grout deterioration, erosion, corrosion, chipping, cracking, or spalling.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems and in support members. During the audit and review, it was not clear to the staff how visual inspections would be used to monitor this aging effect. In a subsequent staff visit to the plant, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections performed quarterly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The staff reviewed the document change request, as documented in the staff's MPS audit and review report, that will add the details for the visual inspection of elastomers to the general condition monitoring program. The applicant stated in the LRA that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the LRA, Appendix A, Table 6.0-1, Item 10. Based on discussions with plant staff and the review of the LRA commitment and document change request, the staff concurs that change in material properties can be visually observed.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The general condition monitoring program is acceptable because the visual inspections for material loss, cracking, and change in material properties are intended to detect the presence and extent of aging effects. On this basis, the staff finds that the parameters monitored or inspected program element is acceptable.

(4) Detection of Aging Effects -The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that the external condition of components and structures is determined by visual inspection. These inspections provide information to help manage the aging effects of loss of material, cracking, and change in material properties. The applicant also stated, in Appendix B, Section B2.1.13 of the LRA, that visual monitoring of the systems, structures, and components in normally accessed areas is performed in accordance with the guidance provided in administrative and surveillance procedures. The inspection frequency varies from twice a day to once per refueling outage, in accordance with applicable station procedures.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems and in support members. During the audit and review, it was not clear to the staff how visual inspections would be used to monitor this aging effect. In a subsequent staff visit to the plant, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections performed quarterly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The staff reviewed the document change request, as documented in the staff's MPS audit and review report, that will add the details for the visual inspection of elastomers to the general condition monitoring program. The applicant stated in the LRA that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant's license renewal commitment list in the LRA Appendix A, Table 6.0-1, Item 10. Based on the review of the LRA commitment and document change request, the staff concurs that change in material properties can be visually observed.

The staff reviewed and confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. The detection of aging effects identifies the specific components for which the program manages aging. On this basis, the staff finds that the applicant's detection of aging effects program element is acceptable.

(5) Monitoring and Trending -The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that observations of significant degradation are identified for engineering evaluation and documented in accordance with governing procedures. Additionally, system health reports provide a quarterly engineering perspective on system conditions and provide an effective tool by which management can focus attention and resources on systems that do not meet performance goals.

Degradation due to boric acid corrosion is monitored and trended by the activities in the general condition monitoring program in conjunction with the corrective action program. When degradation is identified through general condition monitoring, the corrective action program is utilized to track the specific issue, provide corrective actions, and trend the general issue.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. Trending of the inspection results will be performed and will enhance the applicant’s ability to detect aging effects before there is a loss of intended function. On this basis, the staff finds that the applicant’s monitoring and trending program element is acceptable.

(6) Acceptance Criteria - The applicant stated, in Appendix B, Section B2.1.13 of the LRA, that the acceptance criterion for visual inspections is the absence of any visual indication of external degradation. Evaluations of anomalies found during general condition monitoring activities determine whether analysis, repair, or further inspection is required. Degraded conditions that are adverse to quality are entered into the corrective action program.

The general condition monitoring program also credits visual inspection for the detection of changes in material properties in elastomers in the ventilation systems and in support members. During the audit and review, it was not clear to the staff how visual inspections would be used to monitor this aging effect. In a subsequent staff visit to the plant, the applicant stated that the change of material properties for these elastomer components is visually observable by evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the general condition monitoring activities performed by the system engineers as part of comprehensive inspections performed monthly, and by the plant equipment operators during daily inspections of plant areas to verify component or system operation. The staff reviewed the document change request, as documented in the staff’s MPS audit and review report, that will add the details for the visual inspection of elastomers to the general condition monitoring program. The applicant stated in the LRA that the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide a reasonable assurance that changes in material properties of elastomer components will be adequately managed. This commitment is identified on the applicant’s license renewal commitment list in the LRA, Appendix A, Table 6.0-1, Item 10. Based on discussions with plant staff and the review of the LRA commitment and document change request, the staff concurs that change in material properties can be visually observed.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated to determine whether the observed deterioration of material condition is significant enough to compromise the ability of the in-scope structures and components to perform their intended functions. If found unacceptable, corrective measures will be implemented. On this basis, the staff finds that the applicant’s acceptance criteria program element is acceptable.

(7) Operating Experience - The applicant stated, in the program basis document, that the effects of aging are found in normally accessed areas during routine work tasks, walkdowns, and inspections. Engineering evaluations and corrective actions are implemented, as necessary, to correct conditions that are adverse to quality. Management of degradation due to aging effects is not typically required and minor degradation is resolved through the work control process. Additionally, inspection results from reviews by outside organizations are used to help confirm that plant integrity and material condition are maintained.

The staff's review of station operating experience indicates that while degradation has occurred, routine work tasks, walkdowns and inspection activities have been effective in identifying anomalies and implementing corrective actions. When inspection results have warranted, corrective actions have been implemented to ensure that the structures and components continue to perform their intended function.

No operating experience was identified that allowed the staff to conclude that general condition monitoring activities have been effective in managing changes in the material properties of elastomers in the ventilation systems or in support structures and components. However, as part of the commitment identified in LRA Appendix A, Table 6.0-1, Item 10, the procedures and training for personnel performing general condition monitoring inspections and walkdowns will be enhanced to identify the requirements for the inspection of aging effects. This will provide reasonable assurance that changes in material properties of elastomer components will be adequately managed.

On the basis of its review of the above operating experience, the staff concludes that the general condition monitoring program will adequately manage the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.13 of the MPS Unit 2 LRA and Appendix A, Section A2.1.12 of the MPS Unit 3 LRA, the applicant provided the FSAR supplement for the general condition monitoring program and stated that the program manages the aging effects of loss of material, change of material properties, and cracking on the external surfaces of components. It is performed in accessible plant areas for components and structures including those within the scope of license renewal and involves visual inspections for evidence of age-related degradation. The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The staff reviewed the FSAR supplements and confirmed that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.3 Infrequently Accessed Areas Inspection Program

Summary of Technical Information in the Application. The applicant's infrequently accessed areas inspection program is described in LRA Section B2.1.15, "Infrequently Accessed Areas Inspection Program." In the LRA, the applicant stated that this program is a new plant-specific program that will be initiated prior to the period of extended operation. The applicant credits this program with managing the aging effects for loss of material, change in material properties, and cracking using visual inspections of the external surfaces of structures and components. All areas not normally accessible for inspection and evaluation, and that contain structures or components subject to aging management, have been identified for inclusion in the program.

The applicant stated in the LRA that a baseline inspection of in-scope structures and components will be performed. An engineering evaluation of the inspection results will be used to determine whether additional inspections of SCs in the infrequently accessed areas inspection program are required.

In the LRA, the applicant stated that the infrequently accessed areas inspection program will be established prior to the period of extended operation. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 12.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Appendix B, Section B2.1.15 of the LRA, regarding the applicant's demonstration of the infrequently accessed areas inspection program to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the infrequently accessed areas inspection program against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3, and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is provided separately in Section 3.0.4 of this SER. The remaining seven elements are discussed below.

(1) Scope of the Program - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that the following infrequently accessed areas of the plant are in scope of this program: Unit 2 and Unit 3 intake structure circulating water bays (below the floor and above the water); Unit 2 bypass line (interior of the concrete pipe); Unit 3 auxiliary building heat exchanger room at elevation 4-feet, 6-inch elevation; Unit 3 service water pipe enclosure in the control building; Unit 3 regenerative heat exchanger room in containment; Unit 3 auxiliary building to fuel building pipe tunnel; Unit 3 containment enclosure building (supplementary leak collection-and-release system duct); Unit 3 area between the reactor vessel and neutron shield tank in containment; Unit 3 emergency diesel generator cubicles upper level area; Unit 3 cable spreading area, north and south electrical tunnels, tops of the switchgear rooms; Unit 3 recirculation tempering line (interior of concrete pipe) and associated valve pit; Unit 3 auxiliary building demineralizer alley (inside the cubicles); and MPS stack.

    The staff reviewed and confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3 of the SRP-LR. The proposed scope identifies the specific components for which the program manages aging. On this basis, the staff team finds that the applicant's proposed program scope is acceptable.

(2) Preventive Actions - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that the inspection activities for infrequently accessed areas are designated condition monitoring. No preventive actions are performed.

The staff confirmed that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The staff did not identify the need for preventive actions for the infrequently accessed areas inspection program because it is a condition monitoring program.

(3) Parameters Monitored or Inspected - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that infrequently accessed areas will undergo visual inspections to identify degradation or adverse conditions that include component leakage; rust or corrosion products; peeling, bubbling, or flaking coatings; indications of chemical attack; corroded fasteners; deformed or mispositioned piping and cable supports; and cracking of concrete, supports, or sealant.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. The infrequently accessed areas inspection program is acceptable because the visual inspections for loss of material, change in material properties, and cracking are intended to detect the presence and extent of aging effects. On this basis, the staff finds that the parameters monitored or inspected program element is acceptable.

(4) Detection of Aging Effects - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that the external conditions of structures and components located in the infrequently accessed areas are determined by visual inspection. These inspections detect the aging effects of loss of material, cracking, and change of material properties. An inspection plan will be developed and inspections in infrequently accessed areas will be performed prior to the period of extended operation. The inspections will assess the aging of in-scope components and structures located in the infrequently accessed areas identified above. An engineering evaluation of the inspection results will determine the need for subsequent inspections.

The staff reviewed and confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. The use of visual inspection of the external condition of infrequently accessed structures, supports, piping, and equipment is consistent with industry practices, and is considered by the staff to be a reasonable means of detecting loss of material, cracking, and change in material properties before the loss of intended function. On this basis, the staff finds that the applicant’s detection of aging effects program element is acceptable.

(5) Monitoring and Trending - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that monitoring of the structures and components in infrequently accessed areas will be accomplished through the performance of baseline inspections. These inspections will be conducted prior to the period of extended operation. Inspection results will be documented for engineering evaluation and retention.

The staff confirmed that this program element satisfies the criteria in Appendix A.1.2.3.5 of the SRP-LR. The applicant committed to conducting one-time inspections prior to the end of the current operating license term and will document the results for evaluation and retention. If degradation is identified, it will be evaluated and corrected in accordance with the applicant’s corrective action program. Trending is currently not part of this program and none is required by current industry practices for visual inspection activities in similar applications. On this basis, the staff finds that the applicant’s monitoring and trending program element is acceptable.

(6) Acceptance Criteria - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that the acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Degradation that is adverse to quality will be entered into the corrective action system.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Any anomalous indications that are signs of degradation will be evaluated by an engineer to determine whether the observed deterioration of material condition is significant enough to compromise the ability of an SC in an infrequently accessed area to perform its intended function. If found unacceptable, corrective measures will be implemented. On this basis, the staff finds that the acceptance criteria program element is acceptable.

(7) Operating Experience - The applicant stated, in Appendix B, Section B2.1.15 of the LRA, that the infrequently accessed areas inspection program is a new program for which there is no operating experience.

The staff finds that the one-time baseline inspections of infrequently accessed areas are consistent with years of industry practice that has been effective in maintaining similar SCs and, therefore, can reasonably be expected to be effective at maintaining the intended functions of the SCs that are within the scope of this evaluation for the period of extended operation.

On the basis of its review of the above operating experience, the staff concludes that the infrequently accessed areas inspection program will adequately manage the aging effects that have been observed at the applicant's plant.

<u>FSAR Supplement</u>. In Appendix A, Section A2.1.15 of the MPS Unit 2 LRA and Appendix A, Section A2.1.14 of the MPS Unit 3 LRA, the applicant provided the FSAR supplements for the infrequently accessed areas inspection program, which state that the program will manage the aging effects of loss of material, change in material properties, and cracking. Visual inspections will be performed to ensure the absence of anomalous indications that are signs of degradation. The acceptance criterion for the visual inspections is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The staff reviewed the FSAR supplements and confirmed that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

<u>Conclusion</u>. On the basis of its review and audit of the applicant's program, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.4 Work Control Process

Summary of Technical Information in the Application. The applicant's work control process is described in LRA Section B2.1.25, "Work Control Process." In the LRA, the applicant stated that this is an existing plant-specific program. The applicant credits the work control process as means for planning and conducting maintenance activities to manage the aging effects on system components, commodities, and adjacent piping, and structures within the scope of license renewal. Preventive and corrective maintenance activities are planned and conducted in accordance with the applicant's work control process.

The applicant stated in the LRA that the work control process is used to manage the aging effects of buildup of deposits, change of material properties, cracking, and loss of material for components and plant commodities within the scope of license renewal. Maintenance activities performed under the work control process provide an opportunity to visually inspect system components, commodities, and adjacent piping, and plant structures. Adjacent piping, including surfaces immediately adjacent to a component, is accessible for visual inspection through the component. Plant structures are accessible when an area next to a structure is excavated for other maintenance work. The work control process also provides opportunities to collect oil and engine coolant fluid samples for subsequent analysis of contaminants and chemical properties, which could either indicate or affect aging. The work control process tracks and documents the performance of inspection and surveillance activities, such as Appendix R fire cage inspections and pump-down and inspection of underground electrical cable enclosures. Maintenance activities performed through the work control process also verify the effectiveness of the chemistry control for primary systems, chemistry control for secondary systems, and fuel oil chemistry programs.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Appendix B, Section B2.1.25, of the LRA, regarding the applicant's demonstration of the work control process to ensure that the effects of aging, as discussed above, will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the work control process against the AMP elements found in the SRP-LR, Appendix A, Section A.1.2.3, and SRP-LR Table A.1-1 and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is provided separately in Section 3.0.4 of this SER. The remaining seven elements are discussed below.

- Scope of the Program - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that the program encompasses performance testing and maintenance activities (preventive and corrective) that are planned and conducted in accordance with the work control process. These activities provide an opportunity to perform and document visual inspections of the internal and external surfaces of various material and environment combinations of plant components and commodities within the scope of license renewal, including visual examination of the internal and external surfaces of plant components, visual examination of plant commodities, performance (periodic) tests of mechanical components, routine maintenance sampling of motor lubricating oil and engine coolant, recurring inspection and surveillance activities, equipment monitoring, and data trending and analysis. Activities performed by the work control process also verify the effectiveness of other aging management programs.

The staff requested that the applicant provide additional information to confirm that all of the component groups listed in Section 3 of the MPS Units 2 and 3 LRAs that credit the work control process program are covered by the planned maintenance portion (i.e., preventive maintenance, predictive analysis, periodic surveillance) of the work control process program such that these components will be periodically inspected during the period of extended operation.

In an LRA supplement letter, dated July 7, 2004, (ML041900407), the applicant stated the following in response to the staff's request:

The following wording should be added to MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25 (page B-112):

> Enhancement 2 - Verification of Program Scope
>
> A review of the Work Control Process inspection opportunities for each material and environment group, supplemental to the initial review conducted during the development of the LRA, will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the Work Control Process. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Items (31 for MPS Unit 2) (32 for MPS Unit 3).
>
> This commitment will be implemented prior to the period of extended operation.

The staff reviewed and confirmed that this program element, as modified, satisfies the criterion defined in Appendix A of the SRP-LR. The proposed scope, including the enhancements change, identifies the specific components for which the program manages aging. On this basis, the staff finds that the applicant's proposed program scope is acceptable.

- Preventive Actions - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that the inspection activities conducted as part of the work control process program are designated as condition monitoring, the testing activities of the work control process program are designated as performance monitoring, and the chemistry control activities, in conjunction with the maintenance sampling activities, are designated as preventive actions.

  The staff confirmed that this program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The absence of preventive actions in the condition and performance monitoring portions of the program is consistent with the requirements of the SRP-LR. Description of the chemistry control activities and sampling activities as preventive is appropriate. On this basis, the staff finds the preventive actions program element is acceptable.

- Parameters Monitored or Inspected - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance to determine the presence of cracking, loss of material, change of material properties, and buildup of deposits. Lubricating oil and engine coolant samples are analyzed to detect contaminants that may indicate an environment that can lead to material degradation.

This AMP identifies the use of lubricating oil analysis to detect contaminants. During the audit, the staff requested that the applicant provide information to show that oil sampling is performed to specific industry standards and that the samples are representative, and to identify the basis for the frequency of sampling and present operating experience to demonstrate that the sampling is effective in detecting contaminants. The applicant identified to the staff that the governing procedures for oil sampling at MPS are CBM-103 "Oil Sampling" and CBM-106 "Oil Analysis." The sampling procedures include a check for the presence of water. Frequencies for sampling are established based on equipment operating schedules, operating history, etc. Corrective actions are determined to resolve abnormal indications. The staff reviewed oil sampling procedures and finds the information presented therein to be acceptable.

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.3 of the SRP-LR. On the basis of interviews with the applicant's technical staff and the enhancement to the scope of program element, the staff finds that the applicant's parameters monitored or inspected program element is acceptable.

- Detection of Aging Effects - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that cracking, loss of material, buildup of deposits, and changes of material properties are the aging effects that are monitored by visual inspections of the internal and external surfaces of structural and mechanical components, and plant commodities. The results of analyses of lubricating oil and engine coolant samples provide indication of any adverse environment that could lead to material degradation.

  The applicant stated in the LRA that the program will be enhanced such that changes will be made to maintenance and work control procedures to ensure that inspections of plant components and commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities.

  In the LRA, the applicant also stated that maintenance and work control procedures ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented during maintenance activities. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 25 (MPS Unit 2) and 26 (MPS Unit 3).

  The work control process credits visual inspection for the detection of changes in material properties in rubber in steam generator nozzle dams and holddown rings, elastomers in ventilation systems, rubber expansion joints in the condensate system, O-rings and gaskets in containment structures (personnel hatch and reactor cavity seal) supports, the spent fuel pool gate seal, fire/EQ barrier penetration seals, and gaskets (in junction, terminal, and pull boxes).

  The staff could not determine how visual inspections could be used to manage this aging effect and requested further clarification from the applicant. During the audit, the applicant stated to the staff that the change of material properties for these elastomer components is visually observable by such conditions as evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resilience and indentation recovery, etc. These conditions are observable during the internal inspections performed as part of the work control process program. The staff reviewed the document change request, as documented in the staff's MPS audit and review report, that will add the details for the visual inspection of elastomers to the work control process. The staff finds that change of material properties could be observable visually as clarified by the applicant.

The applicant stated in the LRA that selective leaching was not identified during the applicant's aging management reviews as an aging mechanism requiring management. However, the LRA Table 3.3.1, stated that components (aluminum bronze, brass, cast iron, cast steel) in open- and closed-cycle cooling water systems and the ultimate heat sink are subject to loss of material due to selective leaching. The applicant identified in LRA Table 3.3.1, the work control process and buried pipe inspection programs to manage selective leaching. In discussions between the staff and the applicant, the applicant stated that the purpose of crediting the work control process program with managing the effects of selective leaching was to provide an accounting of which GALL AMPs were being implemented at MPS, and that the wording in LRA Table 3.3.1 was not intended to indicate that selective leaching does not require management at MPS.

GALL AMP XI.M.33, "Selective Leaching of Materials," recommends a combination of one-time inspection and hardness measurement to manage selective leaching. Since selective leaching is a slow-acting corrosion process, it is recommended that this should be performed as late in the plant life as possible, preferably after 30 years of service.

Selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection. Hence, the GALL Report recommends a Brinnell hardness test be performed on the inside surfaces of a selected set of components to determine if selective leaching has occurred. Alternatively, if a component is removed from service for whatever reason, a destructive test could be performed.

The applicant stated in the LRA that the work control process program credits visual inspection only for detection of selective leaching. During the audit, the staff asked the applicant to justify the use of visual inspection only, or to provide other means of detection such as, Brinnell hardness, destructive testing, or other mechanical means such as scraping, chipping, etc.

In an LRA supplement letter dated July 7, 2004, (ML041900407), the applicant stated the following:

> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25, Detection of Aging Effects (page B-109), the following should be inserted after the first sentence:
>
> "When performing field inspections for loss of material due to selective leaching, visual inspections will include mechanical means, such as resonance when struck by another object, scraping, or chipping."
>
> For MPS Unit 2 and Unit 3 Appendix B, Section B2.1.25, new Enhancement 3 should be added and read (page B-112), as follows:
>
> Enhancement 3: Selective Leaching Inspections
>
> Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods prior to entering the period of extended operation.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Item 30 (MPS Unit 2) and 31 (MPS Unit 3).

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

Detection of Aging Effects

The NUREG-1801 program element identifies that the program should detect aging effects before there is a loss of structure or component intended function. The baseline inspection for selective leaching will provide reasonable assurance that the loss of material aging effect, due to selective leaching, will be detected before there is a loss of intended function.

The staff finds the revisions to the MPS LRA, as presented in the supplement letter, to be acceptable.

The results of analyses of lubricating oil and engine coolant samples provide indication of any adverse environment that could lead to material degradation. The applicant’s work control process program, as described in the LRA, identifies the use of lubricating oil analysis to detect contaminants. During the audit, the staff requested that the applicant provide information to show that oil sampling is performed to specific industry standards and that the samples are representative, and to identify the basis for the frequency of sampling and present operating experience to demonstrate that the sampling is effective in detecting contaminants. The applicant stated to the staff the governing procedures for oil sampling at MPS are CBM-103 and CBM-106. The sampling procedures include a check for the presence of water. Frequencies for sampling are established based on equipment operating schedules, operating history, etc. Corrective actions are determined to resolve abnormal indications. The staff reviewed oil sampling procedures and finds the information presented therein to be acceptable.

The staff reviewed and confirmed that this program element, as modified, satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR with enhancements, revisions, and clarifications as identified above. The measurements and inspections use a frequency and sample size based on operating experience to detect the presence and extent of aging effects. On this basis, the staff finds that the detection of aging effects program element is acceptable.

- Monitoring and Trending - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that frequencies of preventive maintenance work activities vary, with some activities being performed only during refueling outages. Monitoring these activities involves reviews of the documentation generated by the work control process program, including completed procedures and technical reviews of engineering evaluations. In addition, as described in the applicant’s procedures, reviews and evaluations are conducted for changes to preventive maintenance work activities, including deferrals, missed implementation dates, and frequency changes, as well as additions, revisions, or deletions. The applicant stated in the LRA that the reviews are conducted by system engineers, preventive maintenance coordinators, and affected program owners, as appropriate.

In the LRA, the applicant stated that an integral function of the work control process program is to maintain a component work history database to support long-term equipment reliability monitoring, trending, and analysis. The work history database is maintained and accessible.

In the LRA, the applicant also stated that maintenance and work control procedures ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented during maintenance activities.

The applicant stated in the LRA that the program will be enhanced such that changes will be made to maintenance and work control procedures to ensure that inspections of plant components and commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities. This commitment is identified in Appendix A, Table A6.0-1 License Renewal commitments, Items 25 (MPS Unit 2) and 26 (MPS Unit 3).

The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. Trending of inspection results will be performed and will enhance the applicant's ability to detect aging effects before there is a loss of intended function. On this basis, the staff finds that the applicant's monitoring and trending program element is acceptable.

- Acceptance Criteria - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that the acceptance criterion for visual inspections is the absence of anomalous signs of degradation. The acceptance criteria for testing or sampling are specified in the various station procedures and/or vendor technical manuals or recommendations. Evidence of aging effects that are potentially adverse to quality is entered into the corrective action program and engineering evaluations are performed as necessary to determine whether the observed condition is acceptable without repair, or if repair or replacement is necessary.

  The staff confirmed that this program element satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. Appropriate criteria are in place and any evidence of aging effects potentially adverse to quality will be adequately documented and appropriate action taken per the applicant's corrective action program. On this basis, the staff finds that the acceptance criteria program element is acceptable.

- Operating Experience - The applicant stated, in Appendix B, Section B2.1.25 of the LRA, that the work control process activities that involve component inspections, performance testing, and fluid sampling are performed routinely. The applicant has reviewed site-specific work history data to confirm that an adequate number of inspection opportunities are afforded by the work control program. The applicant also stated in the LRA that the plant corrective action program, which captures internal and external plant operating experience issues, provides reasonable assurances that operating experience will be reviewed in the future to provide objective evidence to support the conclusion that the effects of aging will be managed adequately.

  The staff reviewed an assessment based on observations made during industry group evaluations (e.g., Institute of Nuclear Power Operations) regarding the station's operation and material condition. Based on the staff's review of that assessment and of station-specific operating experience, the staff finds that the work control process program has been effective in identifying anomalies, implementing appropriate corrective actions, and trending parameters. When inspection results have indicated signs of degradation, corrective actions have been implemented to ensure the continued capability of the system to perform its intended functions.

On the basis of its review of the above operating experience, the staff finds that the work control process will adequately manage the aging effects that have been observed at the applicant's plant.

FSAR Supplement. In Appendix A, Section A2.1.25 of the MPS Unit 2 LRA and Appendix A, Section A2.1.24 of the MPS Unit 3 LRA, the applicant provided the FSAR supplements for the work control process program which state that the program integrates and coordinates the combined efforts of maintenance, engineering, operations, and other support organizations to manage maintenance activities. The program manages the aging effects of loss of material, change of material properties, cracking, and buildup of deposits for components and plant commodities within the scope of license renewal. The acceptance criterion for visual inspections is the absence of anomalous signs of degradation. The acceptance criteria for testing or sampling are specified in the various station procedures and/or vendor technical manuals or recommendations. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the quality assurance program.

The staff reviewed the FSAR supplement and the additional information as identified in the LRA supplement letter, and confirmed that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the FSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.4 Quality Assurance Program Attributes Integral to Aging Management Program

Pursuant to 10 CFR 54.21(a)(3), a license renewal applicant is required to demonstrate that the effects of aging on SCs subject to an AMR will be adequately managed so that their intended functions will be maintained consistent with the CLB for the period of extended operation. NUREG-1800, Branch Technical Position RLSB-1, "Aging Management Review - Generic," describes ten attributes of an acceptable AMP. Three of these ten attributes (program elements) are associated with the QA activities of (7) corrective action, (8) confirmation process, and (9) administrative control. Table A.1-1, "Elements of an Aging Management Program for License Renewal," of Branch Technical Position RLSB-1 provides the following description of these quality attributes:

- corrective actions, including root cause determination and prevention of recurrence, should be timely;
- the confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective; and,
- administrative controls should provide a formal review and approval process.

NUREG-1800, Branch Technical Position IQMB-1, "Quality Assurance For Aging Management Programs," noted that those aspects of the AMP that affect quality of SR SSCs are subject to the QA requirements of 10 CFR Part 50, Appendix B. Additionally, for NSR SCs subject to an

AMR, the existing 10 CFR Part 50, Appendix B, QA program may be used by the applicant to address the program elements of (7) corrective action, (8) confirmation process, and (9) administrative control. Branch Technical Position IQMB-1 provides the following guidance with regard to the QA attributes of AMPs:

Safety-related SCs are subject to 10 CFR Part 50, Appendix B, requirements which are adequate to address all quality-related aspects of an AMP consistent with the CLB of the facility for the period of extended operation.

For NSR SCs that are subject to an AMR for license renewal, an applicant has an option to expand the scope of its 10 CFR Part 50, Appendix B, program to include these SCs to address corrective action, confirmation process, and administrative control for aging management during the period of extended operation. In this case, the applicant should document such a commitment in the FSAR supplement in accordance with 10 CFR 54.21(d).

3.0.4.1 Summary of Technical Information in Application

Section 3.0, "Aging Management Review Results," of the LRAs provides an AMR summary for each unique structure, component, or commodity group at the MPS, Units 2 and 3, determined to require aging management during the period of extended operation. This summary includes identification of aging effects requiring management and AMPs utilized to manage these aging effects. Appendix A, "FSAR Supplement," and Appendix B, "Aging Management Programs," of the LRA, demonstrate how the identified programs manage aging effects using attributes consistent with the industry and NRC guidance. The applicant's programs and activities that are credited with managing the effects of aging can be divided into three types of programs: existing, enhanced, and new AMPs. In Section A2.0, "Programs That Manage the Effects of Aging," the applicant discusses that the QA program includes the program elements of corrective action, confirmation process, and administrative controls and is applied to both SR and NSR SSCs that are within the scope of license renewal. In Section B.1.3, "Quality Assurance Program and Administrative Controls," the applicant discusses the implementation of 10 CFR 50, Appendix B, and its consistency with the summary in Appendix A.2 of NUREG-1800 (Reference B-1). The QA program includes the elements of corrective action, confirmation process, and administrative control, and is applicable to the SR and NSR SSCs that are subject to an AMR. In many cases, existing programs were found to be adequate for managing aging effects during the period of extended operation. Generically, the three elements are applicable as follows:

(1) Corrective Action - A single corrective actions process is applied regardless of the safety classification of the structure or component. Corrective actions are implemented through the initiation of an action request in accordance with plant procedures established pursuant to 10 CFR 50, Appendix B. Plant procedures require the initiation of an action request for actual or potential problems, including unexpected plant equipment degradation, damage, failure, malfunction, or loss. Site documents that implement AMP for license renewal will direct that an action request be prepared in accordance with those procedures whenever non-conforming conditions are found (i.e., the acceptance criteria are not met). Equipment deficiencies are corrected through the initiation of a work order in accordance with plant procedures. Although equipment deficiencies may initially be documented by a work order, the corrective action process specifies that an action request also be initiated if required.

(2) Confirmation Process - The focus of the confirmation process is on the follow-up actions that must be taken to verify effective implementation of corrective actions. The measure of effectiveness is in terms of correcting the adverse condition and precluding repetition of significant conditions adverse to quality. Plant procedures include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause determinations and prevention of recurrence where appropriate (e.g., significant conditions adverse to quality). These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions are taken. The action request process is also monitored for potentially adverse trends. The existence of an adverse trend due to recurring or repetitive adverse conditions will result in the initiation of an action request. The AMP required for license renewal would also uncover any unsatisfactory condition due to ineffective corrective action. Since the same 10 CFR 50, Appendix B, corrective action and confirmation process is applied for nonconforming SR and NSR SCs subject to AMR for license renewal, the corrective action program is consistent with NUREG-1800.

(3) Administrative Control - Administrative control procedures provide information on procedures and other forms of administrative control documents as well as guidance on classifying documents into the proper document type. Procedure attachments provide a chart showing the administrative controls hierarchy and a document type decision tree.

3.0.4.2 Staff Evaluation

The staff reviewed the applicant's AMPs described in Appendix A, "FSAR Supplement," specifically Appendix A2.0, "Programs That Manage the Effects of Aging," and Appendix B, "Aging Management Programs," specifically Appendix B1.3, "Quality Assurance Program and Administrative Controls," of the MPS Unit 2 and 3 LRAs. The purpose of this review was to assure that the aging management activities were consistent with the staff's guidance described in NUREG-1800, Section A.2, "Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1)," regarding QA attributes of AMPs. Based on the staff's evaluation, the descriptions and applicability of the plant-specific AMPs and their associated quality attributes provided in Appendix A2.0 and Appendix B1.3, the staff concluded that the program descriptions are consistent with the staff's position and the Branch Technical Position discussed in IQMB-1.

The station switchyard, which is not owned by the applicant, contains components which were determined to be in scope of license renewal in accordance with the SBO criterion in 10 CFR 54.4(a)(3) and have been determined to require an AMP. The applicant documented this conclusion and indicated that the applicable switchyard components would be included in the applicable AMP and that the attributes of corrective action, confirmation process, and administrative controls would be administered in accordance with the applicant's 10 CFR Part 50, Appendix B, QA program as discussed in both Appendix A and B of the LRA. In addition, Appendix B of the LRA also identified the addition of the switchyard components to the applicable AMPs.

3.0.4.3 Conclusion

The staff concludes that the QA attributes of the applicant's AMPs are consistent with 10 CFR 54.21(a)(3). Specifically, the applicant described the quality attributes of the programs and activities for managing the effects of aging for both SR and NSR SSCs within the scope of license renewal and stated that the 10 CFR Part 50, Appendix B, QA program addresses the elements of corrective action, confirmation process, and administrative control. Therefore, the applicant’s QA description for its AMPs is acceptable.

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.1A Unit 2 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

This section of the SER documents the staff's review of the applicant's aging management review (AMR) results for the reactor vessel, internals, and reactor coolant system components and component groups associated with the following systems:

- reactor vessel
- reactor vessel internals
- reactor coolant system
- steam generator

3.1A.1 Summary of Technical Information in the Application

In LRA Section 3.1, the applicant provided AMR results for reactor vessel, internals, and reactor coolant system components and component groups. In LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the reactor vessel, internals, and reactor coolant system components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of aging effects requiring management (AERMs). These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.1A.2 Staff Evaluation

The staff reviewed LRA Section 3.1 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the reactor system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Detail of the staff's audit evaluation are documented in the MPS audit and review report and are summarized in Section 3.1A.2.1 of this SER.

The staff also performed an onsite audit of those selected AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.1.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluation are documented in the MPS audit and review report and are summarized in Section 3.1A.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not address in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluation are documented in the MPS audit and review report and summarized in Section 3.1A.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.1A.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the reactor vessel, internals, and reactor coolant system components.

Table 3.1A-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.1 that are addressed in the GALL Report.

Table 3.1A-1 Staff Evaluation for Reactor Vessel, Internals, and Reactor Coolant System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor coolant pressure boundary components (Item Number 3.1.1- 01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue
Steam generator shell assembly (Item Number 3.1.1- 02)	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry	Chemistry control for secondary systems program (B2.1.6); Inservice inspection program: systems, components (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.2)
Pressure vessel ferritic materials that have a neutron fluence greater than 1.0E17 n/cm2 (E>1 MeV) (Item Number 3.1.1- 04)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	TLAA	This TLAA is evaluated in Section 4.2, Reactor Vessel Neutron Embrittlement.
Reactor vessel beltline shell and welds (Item Number 3.1.1- 05)	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Reactor vessel surveillance (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Westinghouse and Babcock & Wilcox (B&W) baffle/former bolts (Item Number 3.1.1- 06)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant-specific		Not applicable (See Section 3.1.2.2.3) MPS Unit 2 is of Combustion Engineering design. Baffle/former bolts are not used in the reactor vessel internals.
Small-bore reactor coolant system and connected systems piping (Item Number 3.1.1- 07)	Crack initiation and growth due to SCC, IGSCC, and thermal and mechanical loading__	Inservice inspection; water chemistry; one-time inspection	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.4)
Vessel shell (Item Number 3.1.1- 10)	Crack growth due to cyclic loading	TLAA		Not applicable (See Section 3.1.2.2.5)
Reactor internals (Item Number 3.1.1- 11)	Changes in dimension due to void swelling	Plant-specific	Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.6)
PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains (Item Number 3.1.1- 12)	Crack initiation and growth due to SCC and/or PWSCC ________	Plant-specific	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18); Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)
CASS reactor coolant system piping (Item Number 3.1.1- 13)	Crack initiation and growth due to SCC	Plant-specific	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni alloys (Item Number 3.1.1- 14)	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)
Westinghouse and B&W baffle former bolts (Item Number 3.1.1- 15)	Crack initiation and growth due to SCC and irradiation-assisted stress corrosion cracking (IASCC)	Plant-specific		Not applicable (See Section 3.1.2.2.8) MPS Unit 2 is of Combustion Engineering design. Baffle/former bolts are not used in the reactor vessel internals.
Westinghouse and B&W baffle former bolts (Item Number 3.1.1- 16)	Loss of preload due to stress relaxation	Plant-specific		Not applicable (See Section 3.1.2.2.9) MPS Unit 2 is of Combustion Engineering design. Baffle/former bolts are not used in the reactor vessel internals.
Steam generator feedwater impingement plate and support (Item Number 3.1.1- 17)	Loss of section thickness due to erosion	Plant-specific		Not applicable (See Section 3.1.2.2.10)
(Alloy 600) Steam generator tubes, repair sleeves, and plugs (Item Number 3.1.1- 18)	Crack initiation and growth due to PWSCC, ODSCC, and/or IGA, or loss of material due to wastage and pitting corrosion, and fretting and wear; or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry	Chemistry control for primary systems program (B2.1.5); Chemistry control for secondary systems program (B2.1.6); Steam generator structural integrity (B2.1.22)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.11)
Tube support lattice bars made of carbon steel (Item Number 3.1.1- 19)	Loss of section thickness due to flow-accelerated corrosion (FAC)	Plant-specific		Not applicable (See Section 3.1.2.2.12)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Carbon steel tube support plate (Item Number 3.1.1- 20)	Ligament cracking due to corrosion	Plant-specific		Not applicable (See Section 3.1.2.2.13)
Steam generator feedwater inlet ring and supports (Item Number 3.1.1- 21)	Loss of material due to flow accelerated corrosion	Combustion engineering (CE) steam generator feedwater ring inspection	Flow-accelerated corrosion program (B2.1.11)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.14) Although the Unit 2 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the flow accelerated corrosion program.
Reactor vessel closure studs and stud assembly (Item Number 3.1.1- 22)	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
CASS pump casing and valve body (Item Number 3.1.1-23)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	Inservice inspection program: systems, components and supports (B2.1.18) .	Consistent with GALL, which recommends no further evaluation (See Section 3.1A.2.1.1)
CASS piping (Item Number 3.1.1-24)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL (See Section 3.1.2.1.1) Loss of Fracture Toughness is managed with inservice inspection program: systems, components and supports, which takes some exception to the GALL AMP.
BWR piping and fittings; steam generator components (Item Number 3.1.1-25)	Wall thinning due to flow- accelerated corrosion	Flow- accelerated corrosion	Flow-accelerated corrosion (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems (Item Number 3.1.1-26)	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting integrity	Consistent with GALL, (See Section 3.1.2.1.3)
CRD nozzle (Item Number 3.1.1-35)	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting) (Item Number 3.1.1-36)	Crack initiation and growth due to cyclic loading, and/or SCC, and PWSCC	Inservice inspection; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor vessel internals CASS components (Item Number 3.1.1-37)	Loss of fracture toughness due thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement	Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
External surfaces of carbon steel components in reactor coolant system pressure boundary (Item Number 3.1.1-38)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Steam generator secondary manways and handholds (carbon steel) (Item Number 3.1.1-39)	Loss of material due to erosion	Inservice inspection		Not applicable (See Section 3.1.2.3.4) The steam generators are recirculating- type steam generators.

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor internals, reactor vessel closure studs, and core support pads (Item Number 3.1.1-40)	Loss of material due to wear	Inservice inspection	Inservice inspection program: reactor vessel internals (B2.1.17); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Pressurizer integral support (Item Number 3.1.1-41)	Crack initiation and growth due to cyclic loading	Inservice inspection	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Upper and lower internals assembly (Westinghouse) (Item Number 3.1.1-42)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring		Not applicable. MPS Unit 2 reactor vessel was designed by Combustion Engineering.
Reactor Vessel internals in fuel zone region (except Westinghouse B&W baffle former bolts) (Item Number 3.1.1-43)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	PWR vessel internals; water chemistry	Inservice inspection program: reactor vessel internals (B2.1.17); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL (See Section 3.1.2.1.4)
Steam generator upper and lower heads, tubesheets, and primary nozzles and safe ends (Item Number 3.1.1-44)	Crack initiation and growth due to SCC, PWSCC, and/or IASCC	Inservice inspection; water chemistry	Inservice inspection program: systems, components and supports (B2.1.18); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Vessel internals (except Westinghouse and B&W baffle former bolts) (Item Number 3.1.1-45)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry	Inservice inspection program: reactor vessel internals (B2.1.17); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor internals (B&W screws and bolts) (Item Number 3.1.1-46)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring		Not applicable. MPS Unit 2 reactor vessel was designed by Combustion Engineering.
Reactor vessel closure studs and stud assembly (Item Number 3.1.1-47)	Loss of material due to wear	Reactor head closure studs		Not consistent with GALL (See Section 3.1.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor internals (Westinghouse upper and lower internal assemblies, CE bolts and tie rods) (Item Number 3.1.1-48)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	Inservice inspection program: reactor vessel internals (B2.1.17)	Not consistent with GALL (See Section 3.1.2.1)

The staff's review of the MPS reactor vessel, internals, and reactor coolant system components and associated components followed one of several approaches. One approach, documented in Section 3.1A.2.1, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system components that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.1A.2.2, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system components that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.1A.2.3, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system components that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the reactor coolant system components is documented in Section 3.0.3 of this SER.

3.1A.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Section 3.1.2.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the reactor vessel, internals, reactor coolant system, and steam generator components:

- boric acid corrosion program
- chemistry control for primary systems program
- chemistry control for secondary systems program
- inservice inspection program: reactor vessel internals program
- inservice inspection program: systems, components and supports program
- reactor vessel surveillance program
- closed-cycle cooling water system program
- general condition monitoring program
- work control process program
- flow-accelerated corrosion program
- steam generator structural integrity program

Staff Evaluation. In Tables 3.1.2-1 through 3.1.2-4 of the LRA, the applicant provided a summary of AMRs for the reactor vessel, internals, reactor coolant system, and steam generator, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the Unit 2 LRA, as documented in the MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.1A.2.1.1 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

In the discussion section of Table 3.1.1, Item 24 of the LRA, the applicant stated that loss of fracture toughness is not an aging effect requiring management for applicable CASS piping and components. During the audit and review, the staff asked the applicant for clarification as to why loss of fracture toughness is not an aging effect requiring management. The applicant replied that loss of fracture toughness of the CASS piping is not an aging effect requiring management because the results of leak-before-break (LBB) analysis demonstrated that there was a large margin between detectable flaw size and flaw instability. The staff reviewed the applicant's TLAA report on "leak-before-break" and found that the LBB analysis is not a flaw tolerance evaluation as specified by the GALL Report. The applicant agreed that the LBB analysis cannot be used to manage the loss of fracture toughness due to thermal aging embrittlement. The applicant submitted an LRA supplement letter dated July 7, 2004, and stated that:

> Note "6" for Unit 2 Tables 3.1.2-1 through 3.1.2-4 (Pages 3-101), should state the following:
>
> > For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.
> >
> > 'Loss of Fracture Toughness' as an aging effect for component groups 'Pipe (Safe Ends for SI and SDC)', 'Pipe (Surge Line Piping and Fittings)', and 'Pressurizer (Safe End for PZR Surge Nozzle)' should be added in Unit 2 Table 3.1.2-3, (pages 3-72, 74, and 77, respectively). The 'Loss of Fracture Toughness' is managed by the inservice inspection program: systems, components and supports and corresponds to GALL Item IV.C2.1-f. The Notes for these entries are "A,6" and the 'Table 1 Item' is "3.1.1-24." The material for the pressurizer component (identified above) will designate that it is CASS material. NOTE: Only the 'Loss of Fracture Toughness' entry will have Note "6" listed for the above component groups.
>
> The "Discussion" column in Unit 2 Table 3.1.1, Item 24, (page 3-31) should have been read as follows:
>
> > Consistent with NUREG-1801. Loss of Fracture Toughness is managed with the inservice inspection program: systems, components and supports and this program takes some exception to the NUREG-1801 AMP.

Additionally, a new commitment, Item 27, should be added to Appendix A, Table A6.0-1 as follows and will be implemented prior to the period of extended operation:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.

The applicant modified the corresponding LRA to reflect the audit findings. The staff reviewed the applicant’s LRA supplement and concluded that the applicant appropriately addressed the aging mechanism with the above mentioned new commitment, as recommended in the GALL Report.

3.1A.2.1.2 Wall Thinning due to Flow-Accelerated Corrosion

Steam Generator Steam Nozzle Flow Restrictor and Steam Nozzle. On page 3-95 of the LRA, the applicant stated that wall thinning due to flow-accelerated corrosion in steam generator flow restrictor exposed to steam is managed using MPS AMP B2.1.11, “Flow-Accelerated Corrosion.” During the audit and review, the staff asked the applicant to clarify how the flow restrictor is being managed using the flow-accelerated corrosion (FAC) program. The applicant replied that FAC concerns for the flow restrictor (restricting venturi) are addressed by video inspection and venturi ID measurements performed as part of MPS AMP B2.1.22, “Steam Generator Structural Integrity,” and not part of the FAC program. The applicant stated that it will provide clarification in an LRA supplement. Furthermore, the applicant stated that the steam nozzle flow restrictor is fabricated from carbon steel and is integral to the steam nozzle. The steam nozzle itself is not subjected to direct steam flow and, therefore, does not have FAC concerns.

By letter dated July 7, 2004, the applicant submitted its LRA supplement letter. In its response, the applicant stated that the FAC AMP should be replaced with MPS AMP B2.1.22, “Steam Generator Structural Integrity” for the 'Steam Nozzle Flow Restrictor' component group in Unit 2 Table 3.1.2-4 (page 3-95). Also, the Note "D" should be "E" for the same entry. In addition, the "Discussion" column in Table 3.1.1, Item 3.1.1-25 (page 3-31), should replace "Flow-Accelerated Corrosion program" with the following:

> Flow-Accelerated Corrosion program for all items except the steam nozzle flow restrictor which is managed by the steam generator structural integrity program AMP.

The staff reviewed the applicant’s response, as documented in the staff’s MPS audit and review report, and confirmed that inspections of the SG flow restrictors are performed. In addition, the applicant utilizes the charged-coupled device (CCD) camera to inspect the steam nozzle venturies and utilizes the video probe to inspect steam nozzle venturies.

For loss of material in a steam environment for the carbon steel steam nozzle and safe-end component group, in LRA Table 3.1.2-4 (page 3-94), the applicant credited both the chemistry control for secondary systems program and the FAC program. In its letter dated July 7, 2004, the applicant stated that the FAC program was inadvertently listed as an aging management program for the steam nozzle and safe-end component group. The staff reviewed the applicant's response and concluded that the chemistry control for secondary systems program alone is adequate to manage this aging effect.

On the basis of its review, the staff concluded that the applicant appropriately addressed the aging mechanism, as recommended by the GALL Report.

Steam Generator Feedwater Nozzle Thermal Sleeve. In LRA Table 3.1.2-4 (page 3-89), the applicant stated that wall thinning due to FAC in steam generator feedwater thermal sleeve exposed to treated water is managed using MPS AMP B2.1.11, "Flow-Accelerated Corrosion." During the audit and review, the staff asked the applicant to clarify how the thermal sleeve is being managed using the FAC program. The applicant replied that there is an inner 16-inch diameter, Schedule 80 carbon steel thermal sleeve (shield) at the feedwater inlet nozzle. Because of the external nozzle, UT examination is not being performed on the thermal sleeve (shield) itself. The applicant initiated a corrective action report to address the need for establishing proper monitoring for wall thickness as part of the FAC program. On the basis of its review, the staff concludes that the applicant's response is acceptable.

3.1A.2.1.3 Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In LRA Table 3.1.1, Item 26 (page 3-31), the applicant stated that cracking and loss of preload are managed using AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports." Also, the applicant stated that loss of material due to wear is not an aging effect requiring management for this bolting.

The staff noted that SRP-LR Table 3.1-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing closure bolting in a high pressure or high temperature system for loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or stress corrosion cracking.

The staff questioned the applicant on whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program was reviewed and is addressed in Section 3.0 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of LRA Table 3.1.1, Item 26 with "consistent with the NUREG-1801."

The staff reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report.

3.1A.2.1.4 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement, and Void Swelling

In LRA, Table 3.1.1, Item 43 (page 3-35), the applicant stated that loss of fracture toughness is managed using MPS AMP B2.1.17, “Inservice Inspection Program: Reactor Vessel Internals.” Also, the applicant stated that MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program” is not credited to manage these aging effects, but is applied to all reactor vessel internals components as a corrosion mitigation program.

The staff reviewed the inservice inspection program: reactor vessel internals program and the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.12 and Section 3.0.3.2.2 of this SER, respectively. On the basis of its review, the staff agreed with the applicant that the chemistry control for primary systems program is a corrosion mitigation program and the program also applies to all reactor vessel internal components. Therefore, the staff concluded that the applicant’s proposed program is adequate to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling.

On the basis of its audit and review, the staff determined that for all other AMRs not requiring further evaluation, as identified in LRA Table 3.1.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further staff review is required.

On the basis of its audit and review, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. The staff has evaluated the applicant's claim of consistency with the GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2 AMR Results That re Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.1.2.2 of the LRA, the applicant provided further evaluation of aging management as recommended by the GALL Report for reactor vessel, internals, reactor coolant system, and steam generator components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to pitting and crevice corrosion
- loss of fracture toughness due to neutron irradiation embrittlement
- crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking
- crack growth due to cyclic loading
- changes in dimension due to void swelling

- crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking
- crack initiation and growth due to stress corrosion cracking or irradiation-assisted stress corrosion cracking
- loss of preload due to stress relaxation
- loss of section thickness due to erosion
- crack initiation and growth due to PWSCC, ODSCC, or intergranular attack or loss of material due to wastage and pitting corrosion or loss of section thickness due to fretting and wear or denting due to corrosion of carbon steel tube support plate
- loss of section thickness due to flow-accelerated corrosion
- ligament cracking due to corrosion
- loss of material due to flow-accelerated corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in Section 3.1.3.2 of the SRP-LR. Details of the staff's audit are documented in the staff's MPS audit and review report. The staff's evaluation of is discuss below.

3.1A.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.1A.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed LRA Section 3.1.2.2.2 against the criteria in SRP-LR Section 3.1.2.2.2.

In Unit 2 LRA Section 3.1.2.2.2, the applicant addressed loss of material of steam generator assemblies due to pitting and crevice corrosion.

SRP-LR Section 3.1.2.2.2 stated that loss of material due to pitting and crevice corrosion could occur in the steam generator shell assembly. The existing program relied on control of water chemistry to mitigate corrosion and ISI to detect cracking due to loss of material. NRC Information Notice (IN) 90-04, "Cracking of the Upper Shell-to-Transition Cone Girth Welds in Steam Generators," stated that if general corrosion pitting of the shell exists, the existing program may not be sufficient. In that case the GALL Report recommends augmented inspections to manage the aging effect.

The AMPs recommended by the GALL Report for managing the aging of steam generator assemblies due to pitting and crevice corrosion are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material and

GALL AMP XI.M2, ”Water Chemistry,” to mitigate corrosion. The GALL Report also recommends a plant-specific program to conduct augmented inspections.

In the Unit 2 LRA, the applicant credits MPS AMP B.2.18, “Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B.2.1.6, “Chemistry Control for Secondary Systems,” for managing loss of material due to pitting and crevice corrosion for the internal surfaces of the steam generator shell. The staff evaluated these programs and its evaluations are documented in Section 3.0.3.2.13 and Section 3.0.3.2.3 of this SER, respectively.

The staff reviewed IN 90-04, which identified the need to augment inspections beyond the requirements of ASME Section XI if general corrosion pitting of the steam generator shell is known to exist in order to differentiate isolated cracks for inherent geometric conditions. In the Unit 2 LRA, the applicant stated that it replaced the Unit 2 steam generators in 1992. The staff reviewed operating experience which indicated that no pitting corrosion of the steam generator shell has been detected to date, and that water chemistry has been maintained for these new steam generators per EPRI guidelines. The staff finds that the augmented inspections recommended by NRC IN 90-04 and referenced in the SRP-LR do not currently apply to the Unit 2 steam generators.

Since pitting corrosion has not been detected on the steam generator shell since installation, the staff finds that augmented inspections are not required and that the current water chemistry control and inservice inspection programs adequately manage this aging effect.

The staff finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

The staff reviewed Unit 2 LRA Section 3.1.2.2.3 against the criteria contained in SRP-LR Section 3.1.2.2.3.

In LRA Section 3.1.2.2.3, the applicant addressed (1) loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials that have a neutron fluence of greater than 10^{17} n/cm^2 at the end of the license renewal term, and (2) loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials. In addition, the applicant stated that (3) the baffle/former bolts are not used in the reactor vessel internals and the discussion in this paragraph of NUREG-1800 is not applicable.

SRP-LR Section 3.1.2.2.3 stated that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and that TLAAs are required to be evaluated in accordance with 10 CFR 54.2.(c)(1). Second, SRP-LR Section 3.1.2.2.3 stated that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Finally, the SRP-LR

Section 3.1.2.2.3 statement that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in Westinghouse and B&W baffle/former bolts. Baffel/former bolts are not applicable to Unit 2 because Unit 2 reactor vessel internals do not include baffle/former bolts.

The AMP recommended by the GALL Report for managing loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel is GALL AMP XI.M31, “Reactor Vessel Surveillance,” which complies with the requirements of 10 CFR Part 50, Appendices G and H, and 10 CFR Part 50.61.

Certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The staff’s evaluation of this TLAA can be found in Section 4.2 of this SER, following the guidance in Section 4.2 of the Standard Review Plan for License Renewal (SRP-LR).

Loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal. NUREG-1801 recommends further evaluation of the reactor vessel materials surveillance program for the period of extended operation. The staff verifies that the applicant has proposed an adequate reactor vessel materials surveillance program for the period of extended operation.

The limiting beltline material for upper shelf energy (USE) at Millstone Unit 2 is the intermediate and lower shell beltline axial welds, heat no. A8746. The limiting beltline material for pressurized thermal shock (PTS) at Millstone Unit 2 is the Lower Shell Plate C-506-1 (Heat No. C5667-1). The Millstone Unit 2, reactor vessel surveillance program, in conjunction with TLAA analyses, effectively manages loss of fracture toughness in the beltline materials. The reactor vessel surveillance program provides adequate material property and neutron dosimetry data to predict fracture toughness in beltline materials at the end of the period of extended operation. The analyses (see TLAAs, SER Section 4.2) for USE and PTS provide assurance that beltline material toughness values in the Millstone Unit 2 reactor vessel will remain at acceptable levels through the period of extended operation. The reactor vessel surveillance program is reviewed in SER Section 3.0.3.1.3 (AMP B2.1.20).

The staff finds that the applicant’s AMR results are consistent with the GALL Report and that the applicant has demonstrated that the programs to manage the effects of aging will be adequate to maintain the intended functions consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking

The staff reviewed LRA Section 3.1.2.2.4 against the criteria contained in SRP-LR Section 3.1.2.2.4.

In LRA Section 3.1.2.2.4, the applicant addressed the potential for crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking (SCC), including intergranular SCC, that could occur in small-bore RCS and connected system piping less than 4-inch nominal pipe size (NPS 4).

SRP-LR Section 3.1.2.2.4 stated that the GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the period of extended operation. The applicant should verify that service-induced weld cracking is not occurring in small-bore piping less than NPS 4. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect is not occurring and that the component's intended function will be maintained during the period of extended operation. Per ASME Section XI, 1995 edition, Examination Category B-J or B-F, small-bore piping, defined as piping less than NPS 4, does not receive volumetric inspection.

The AMPs recommended by the GALL Report are GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," to detect loss of material, and GALL AMP XI.M2, "Water Chemistry," to mitigate SCC.

In the LRA, the applicant credited MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B2.1.5, "Chemistry Control for Primary Systems," to mitigate cracking of reactor coolant piping. The staff evaluated these programs and its evaluation is documented in Section 3.0.3.2.13 and Section 3.0.3.2.2 of this SER, respectively.

To address the GALL Report recommendation that a plant-specific destructive examination or an NDE that permits inspection of the inside surfaces of the piping be conducted, the applicant stated, in the LRA, that it has implemented an RI-ISI methodology to select RCS piping welds for inspection in lieu of the requirements specified in ASME Section XI. To address the GALL Report recommendation for a one-time inspection of small-bore piping less than NPS 4, the applicant indicated in the Unit 2 LRA that small-bore pipe butt-welded connections are included in the final weld selection for performance of volumetric examination. The staff verified that the applicant used the RI-ISI process to determine the most susceptible locations for performing the volumetric examination and did not eliminate small-bore pipe welds.

The staff reviewed and verified that the applicant's RI-ISI plan will perform volumetric examination, which is recommended to address cracking for small-bore Class 1 piping per ISG-12, "One-Time Inspection of Small-Bore Piping," on elements not currently required to be volumetrically examined. Based on the programs identified above, the staff finds that the applicant appropriately evaluated AMR results involving current inspection methods, as detailed in the inservice inspection program, and as supplemented by the water chemistry control, for managing cracking of small-bore piping systems.

The staff finds that the applicant's AMR results are consistent with the GALL Report, and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.5 Crack Growth Due to Cyclic Loading

NUREG-1801 recommends further evaluation of programs to manage crack growth due to cyclic loading in the reactor vessel shell. Crack growth due to cyclic loading in reactor vessel shells are evaluated as a TLAA. Growth of intergranular separations (underclad cracks) in low-alloy or carbon steel heat-affected zones under austenitic stainless steel cladding is a TLAA to be evaluated for the period of extended operation for all the SA 508-Class 2 forgings where the cladding was deposited with a high heat input welding process. Since Millstone Unit 2 does not use SA 508-Class 2 forgings in the beltline region, this evaluation is not applicable. In addition, the Millstone Unit 2 LRA, Section 3.1.2.2.5 states that there are no detected underclad cracks identified in the reactor vessel.

3.1A.2.2.6 Changes in Dimension Due to Void Swelling

In LRA Section 3.1.2.2.6, the applicant addressed changes in dimension due to void swelling that could occur in reactor internals components.

SRP-LR Section 3.1.2.2.6 stated that the GALL Report recommends that changes in dimension due to void swelling in reactor internals components be evaluated to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated to manage the effects of changes in dimension due to void swelling and the loss of fracture toughness associated with swelling.

In general, the applicant has concluded that void swelling is an aging related effect for the reactor vessel internals, but currently only credits the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspections to manage change in dimensions due to void swelling. In lieu of the implementation of augmented inspections, such as enhanced visual VT-1 examinations or enhanced volumetric examination, Millstone will follow industry efforts to determine the necessary steps for managing void swelling. Currently no augmented inspection will be performed. However, since the EPRI Materials Research Project - Reactor Internals Issue Task Group is currently addressing this issue, the applicant will follow the industry effort related to void swelling and will implement the appropriate recommendations resulting from this guidance. In addition, the applicant has identified the implementation of the industry initiatives as commitment 13 in Appendix A, Table A6.0-1 of the LRA.

The staff reviewed the inservice inspection program: reactor vessel internals program and its evaluation is documented in Section 3.0.3.2.12 of this SER. The staff finds that this program is consistent with GALL AMP XI.M13, “Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS),” and GALL AMP XI.M16, “PWR Vessel Internals.”

The staff finds the applicant’s approach for managing changes in dimension due to void swelling acceptable because the approach will be based on the guidelines developed by the ongoing industry activities related to void swelling. The applicant has committed to implement the appropriate recommendations resulting from the industry efforts. The applicant also committed, through an LRA supplement letter, dated July 7, 2004, that the revised program description, including a comparison with the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval prior to the period of extended operation.

The staff finds that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.7 Crack Initiation and Growth Due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking

The staff reviewed LRA Section 3.1.2.2.7 against the criteria in SRP-LR Section 3.1.2.2.7, which recommends plant-specific programs to address these aging mechanisms.

In LRA Section 3.1.2.2.7, the applicant addressed (1) crack initiation and growth due to SCC and primary water stress corrosion cracking (PWSCC) in the pressurizer (spray head assembly/nozzle assembly). Reactor vessel items included in this grouping are the surveillance capsule holders, core stabilizing lugs, core stop lugs, and the flow baffle and skirt. Steam generator items included in this grouping are the tube plate cladding, channel head divider plate, and primary instrument nozzles; (2) crack initiation and growth due to SCC in the pressurizer surge line piping, fittings and pipe (safe-ends for safety injection (SI) and shutdown cooling (SDC)) fabricated of CASS; and (3) crack initiation and growth due to PWSCC in nickel-based alloy components such as the pressurizer instrumentation nozzles, heater sheaths and sleeves, and thermal sleeves.

SRP-LR Section 3.1.2.2.7 states that:

- Crack initiation and growth due to SCC and PWSCC could occur in core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC.
- Crack initiation and growth due to SCC could occur in CASS RCS piping and fittings and pressurizer surge line nozzles. The GALL Report recommends further evaluation of piping that does not meet either the reactor water chemistry guidelines of EPRI TR-105714 or material guidelines of NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," Revision 2, January 1988.
- Crack initiation and growth due to PWSCC could occur in pressurizer instrumentation penetrations and heater sheaths and sleeves made of nickel alloys. The existing program relies on ASME Section XI inservice inspection and on control of water chemistry to mitigate PWSCC. However, the existing program should be augmented to manage the effects of SCC on the intended function of nickel-alloy components. The GALL Report recommends that the applicant provide a plant-specific AMP or participate in industry programs to determine appropriate AMPs for PWSCC of the Alloy 182 weld.

The applicant credited the following plant-specific programs for each of the three SRP-LR criteria:

- Cracking of nickel-based alloy components due to PWSCC is managed by the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” supplemented by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” Additionally, EPRI, through its material reliability program (MRP) and in conjunction with the PWR Owners Group, is developing a strategic plan to manage and mitigate cracking of nickel-based alloy items. The applicant stated that the guidance developed by the MRP will be used to identify the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance as described in the License Renewal Commitment, Item 14.

- Crack initiation and growth due to SCC at welded connections, including the pressurizer surge line and fittings and pipe safe-ends for SI and SDC, is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.”
- The programs credited for the management of PWSCC of these nickel-based alloy items are the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” As described above, the applicant committed to participate in the nickel-based alloys industry programs to identify appropriate aging management activities and will implement the appropriate recommendations from the guidance developed by industry programs.

The GALL Report recommends that a plant-specific aging management program be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of the SRP-LR). The staff reviewed the applicant’s proposed program to ensure that an adequate program will be in place for the management of these aging effects.

Crack initiation and growth due to SCC could occur in PWR cast austenitic stainless steel (CASS) reactor coolant system piping and fittings and the pressurizer surge line nozzle. For PWRs, NUREG-1801 recommends further evaluation of piping that does not meet the reactor water chemistry guidelines of TR-105714, “PWR Primary Water Chemistry Guidelines, Revision 3,” November 1995, or later. Since Millstone Unit 2 uses the guidelines of Revision 4 to TR-105714, no further evaluation of a plant-specific AMP is required since the applicant minimizes the potential for SCC by using the later revision of TR-105714 in accordance with NUREG-1801. In addition the applicant uses AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports” to manage cracking of CASS components. The applicant’s AMP B2.1.18 includes the AMP recommendations for CASS components in NUREG-1801, AMP XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS),” and AMP XI.M1, ”ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD.”

Crack initiation and growth due to PWSCC could occur in PWR pressurizer instrumentation penetrations and heater sheaths and sleeves made of nickel-based alloys. The existing program relies on ASME Section XI Inservice Inspection (ISI) and on control of water chemistry to mitigate PWSCC. However, the existing program should be augmented to manage the effects of SCC on the intended function of components fabricated from nickel-based alloys. NUREG-1801 recommends that the applicant provide a plant-specific AMP or participate in industry programs to determine an appropriate AMP for PWSCC of Inconel 182 weld. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of the SRP-LR). The staff reviewed the applicant’s proposed program to ensure that an adequate program will be in place for the management of these aging effects. Millstone Unit 2 has nickel-based alloys (Alloy 600 and 82/182) in the pressurizer instrumentation penetrations and heater sheaths and sleeves. Millstone Unit 2 has no reactor vessel bottom mounted instrumentation penetrations. Millstone Unit 2 has committed to participate in industry programs to determine appropriate measures to manage PWSCC. This commitment is identified in the Millstone Unit 2 LRA, Appendix A, Table A6.0-1 License Renewal Commitments, Item 14. In addition, the applicant has committed to replace the pressurizer with PWSCC resistant material. The aging management program for PWSCC is discussed in AMP B2.1.18. Additional assurance of crack detection is through the boric acid corrosion program, which is described in AMP B2.1.3. In this program leakage detection is utilized to detect cracks in Alloy 600 base metal and Alloy 82/182 weld metal components in the pressurizer, as specified in NRC Bulletin 2004-01.

The pressurizer spray head for the Millstone Unit 2 is a nickel-based alloy and not CASS. The plant-specific aging management program for managing the aging effects associated with the pressurizer spray head is the chemistry control for primary systems program. NUREG-1801 recommends a plant-specific AMP to be evaluated to manage PWSCC of Alloys 600 and 82/182. However, Dominion stated that it intends to replace the Unit 2 pressurizer during the fall 2006 refueling outage. The replacement pressurizer will be constructed of PWSCC-resistant materials. Therefore, since the pressurizer will be replaced with PWSCC-resistant material, no further evaluation is required for the pressurizer spray head.

The staff’s evaluation of the chemistry control for primary systems program and the inservice inspections programs: systems, components and supports program is documented in Section 3.0.3.2.2 and Section 3.0.3.2.13 of this SER, respectively.

The nickel-based alloys aging management activity is part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and the staff’s evaluation of the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management is documented in Section 3.0.3.2.13 of the SER.

On the basis of its review, the staff finds that the applicant has adequately evaluated the management of crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking for components in the reactor systems, as recommended in NUREG-1801. On the basis of this finding, and the finding that the remainder of the applicant’s program is consistent with NUREG-1801, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.8 Crack Initiation and Growth Due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking

The staff reviewed LRA Section 3.1.2.2.8 against the criteria in SRP-LR Section 3.1.2.2.8.

In LRA Section 3.1.2.2.8, the applicant addressed crack initiation and growth due to SCC or irradiation-assisted stress corrosion cracking (IASCC) that could occur in baffle/former bolts in the reactor. The applicant stated that Unit 2 reactor vessel internals do not include baffle/former bolts and that the discussion in this paragraph of the SRP-LR is not applicable. SRP-LR Section 3.1.2.2.8 stated that crack initiation and growth due to SCC or IASCC could occur in baffle/former bolts in the reactors. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. On the basis that the baffle/former bolts are not part of the Unit 2 design of reactor vessel internals, the staff finds that this aging effect is not applicable to Unit 2.

3.1A.2.2.9 Loss of Preload Due to Stress Relaxation

The staff reviewed LRA Section 3.1.2.2.9 against the criteria in SRP-LR Section 3.1.2.2.9.

In LRA Section 3.1.2.2.9, the applicant stated that baffle/former bolts are not used in the reactor vessel internals and that the discussion in this paragraph of the SRP-LR is not applicable. SRP-LR Section 3.1.2.2.9 stated that loss of preload due to stress relaxation could occur in baffle/former bolts in the reactor. The GALL Report recommends a plant-specific AMP to ensure that this aging effect is adequately managed. On the basis that the baffle/former bolts are not part of the Unit 2 design of reactor vessel internals, the staff finds that this aging effect is not applicable.

3.1A.2.2.10 Loss of Section Thickness Due to Erosion

The staff reviewed LRA Section 3.1.2.2.10 against the criteria in SRP-LR Section 3.1.2.2.10. In LRA Section 3.1.2.2.10, the applicant stated that the Unit 2 steam generators do not have feedwater impingement plates and that the discussion in this paragraph of the SRP-LR is not applicable. SRP-LR Section 3.1.2.2.10 stated that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed. On the basis that feedwater impingement plates are not part of the Unit 2 steam generator design, the staff finds that this aging effect is not applicable to Unit 2.

3.1A.2.2.11 Crack Initiation and Growth Due to Primary Water Stress Corrosion Cracking, Outside Diameter Stress Corrosion Cracking, or Intergranular Attack or Loss of Material Due to Wastage and Pitting Corrosion or Loss of Section Thickness Due to Fretting and Wear or Denting Due to Corrosion of Carbon Steel Tube Support Plate

The staff reviewed LRA Section 3.1.2.2.11 against the criteria in SRP-LR Section 3.1.2.2.11.

In LRA Section 3.1.2.2.11, the applicant addressed crack initiation and growth due to PWSCC, outside diameter SCC, or intergranular attack (IGA) or loss of material due to wastage and pitting corrosion or deformation due to corrosion that could occur in nickel-based alloy components of the steam generator tube plugs.

For the tube component type of nickel-based alloy material in a treated water environment, the plant-specific note in the LRA Table 3.1.2.4 (page 3-97), indicates that the material for this component is not addressed by the GALL Report. Furthermore, these tubes are fabricated from Alloy 690. The applicant also stated that Alloy 690 is a high-chromium nickel-based alloy that is more resistant to SCC than Alloy 600. For that reason, the applicant stated that the material match was not made to the GALL Report items that referenced Alloy 600 material. Therefore, the tubes discussion is addressed in Section 3.1A.2.3.4 of this SER.

SRP-LR Section 3.1.2.11 states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in Alloy 600 components of the steam generator tubes, repair sleeves, and plugs. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06, "Steam Generator Program Guidelines.” These guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other regulatory bases for steam generator degradation management, should be developed to ensure that this aging effect is adequately managed.

The SRP-LR also states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA or loss of material due to wastage and pitting corrosion or deformation due to corrosion could occur in nickel-based alloy components of the steam generator tubes and plugs.

To manage the effects of aging, the applicant credits MPS AMP B2.1.23, “Steam Generator Structural Integrity,” supplemented by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.6, “Chemistry Control for Secondary Systems Program.” The staff’s evaluation of the steam generator structural integrity program is documented in Section 3.0.3.1 of this SER. The staff reviewed the chemistry control for primary systems and chemistry control for secondary systems programs and its evaluations are documented in Section 3.0.3.2.2 and Section 3.0.3.2.3 of this SER, respectively. For general and pitting corrosion, assessment of tube integrity, and plugging or repair criteria of flawed tubes, the steam generator structural integrity program acceptance criteria are in accordance with NEI 97-06 guidelines.

On the basis of its review of the primary and secondary water chemistry control, the staff finds that the applicant appropriately evaluated AMR results involving plant-specific programs to address these aging mechanisms, as recommended in the GALL Report.

The staff finds that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation.

3.1A.2.2.12 Loss of Section Thickness Due to Flow-Accelerated Corrosion

The staff reviewed LRA Section 3.1.2.2.12 against the criteria in SRP-LR Section 3.1.2.2.12.

In LRA Section 3.1.2.2.12, the applicant stated that the steam generator tube support lattice bars are constructed of stainless steel. Therefore, loss of section thickness of these bars is not an applicable aging effect for Unit 2. SRP-LR Section 3.1.2.2.12 states the loss of section thickness due to FAC could occur in tube support lattice bars made of carbon steel. The GALL Report recommends that a plant-specific AMP be evaluated and, on the basis of the guidelines of NRC GL 97-06, an inspection program for steam generator internals be developed to ensure that this aging effect is adequately managed. On the basis that carbon steel tube support lattice bars are not part of the Unit 2 steam generator design, the staff finds that this aging effect is not applicable.

3.1A.2.2.13 Ligament Cracking Due to Corrosion

The staff reviewed LRA Section 3.1.2.2.13 against the criteria in SRP-LR Section 3.1.2.2.13. In LRA Section 3.1.2.2.13, the applicant stated that tube support plates are not used in the steam generators. Therefore, ligament cracking due to corrosion is not an applicable aging effect for Unit 2. SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other regulatory bases for steam generator degradation management, be developed to ensure that this aging effect is adequately managed. On the basis that tube support plates are not used in the steam generators at Unit 2, the staff finds that this aging effect is not applicable.

3.1A.2.2.14 Loss of Material Due to Flow-Accelerated Corrosion

The staff reviewed LRA Section 3.1.2.2.14 against the criteria in SRP-LR Section 3.1.2.2.14.

SRP-LR Section 3.1.2.2.14 states that loss of material due to FAC could occur in the feedwater inlet ring and supports. As noted in Combustion Engineering (CE) IN 90-04, NRC IN 91-19, "Steam Generator Feedwater Distribution Piping Damage," and License Event Report (LER) 50-362/90-05-01, this form of degradation has been detected only in certain CE System 80 steam generators. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting loss of material due to FAC.

The staff noted, in LRA Table 3.1.2-4 (page 3-88), that for loss of material of the feedwater inlet ring and the support component type of carbon steel exposed internally to a treated water environment, the applicant credited the chemistry control for secondary systems program. During the audit, the staff asked the applicant to clarify why the FAC program is not assigned to this component.

The applicant responded in its LRA supplement letter dated July 7, 2004, that the FAC program should be added for the feedwater inlet ring and support component type. In addition, the GALL Report item match for this entry should be IV.D1.3-a with Note B. Also, the 'Table 1 Item' entry should be 3.1.1-21. Furthermore, the applicant stated that LRA Section 3.1.2.2.14 (page 3-20) and LRA Table 3.1.1, the discussion column for Item 3.1.1-21 (page 3-30), should state:

> Although the Unit 2 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the Flow Accelerated Corrosion program.

The staff further requested that the applicant clarify how the FAC inspection of the steam generator feedwater ring would be performed. The applicant responded that FAC inspection of the feedwater inlet is performed using the program generic FAC inspection techniques for gridding and UT.

On the basis of its review, the staff finds that the applicant has demonstrated that the effect of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.15 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent, and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.1.2-1 through 3.1.2-4 of the Unit 2 LRA, the applicant provided additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In Tables 3.1.2-1 through 3.1.2-4, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material and environment combination that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff's evaluation is discussed below in Sections 3.1A.2.3.1 through 3.1A.2.3.3

3.1A.2.3.1 Reactor Vessel Aging Management Evaluation - Table 3.1.2-1

In Section 3.1.2.1.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor vessel and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- inservice inspection program: reactor vessel internals
- inservice inspection program: systems, components and supports
- reactor vessel surveillance

In Table 3.1.2-1 of the LRA, the applicant provided a summary of AMRs for the reactor vessel and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed Table 3.1.2-1 of the Unit 2 LRA, which summarized the results of AMR evaluations for the reactor vessel component groups. The staff has reviewed the information in this table and agrees that the applicant has identified the applicable aging effects because the aging effects are appropriate for these materials and environment and are consistent with industry operating experience, except for the following components, which are discussed below.

NUREG-1801, Section IVA2.8-b states that the pressure vessel skirt support, cantilever/column support, and neutron shield tank are subject to loss of material due to boric acid corrosion. The applicant was requested in RAI 3.1.1-1 to include this aging effect and the necessary AMPs for these components concerning loss of material due to boric acid corrosion in Table 3.1.2-1 of the LRA or provide justification for concluding that boric acid corrosion is not an aging effect.

In response to RAI 3.1.1-1, in a letter dated December 3, 2004, the applicant stated that the structural supports for major reactor coolant system components are evaluated separately from the component and its integral parts, as NSSS Equipment Supports. There are no skirt support, cantilever/column support, or neutron shield tank components for the Millstone Unit 2 reactor vessel support system. The Millstone Unit 2 reactor pressure vessel supports are included as structural members in LRA Table 3.5.2-24. Therefore, loss of material due to boric acid corrosion is identified for these structural members consistent with NUREG-1801 item III.B1.1.1-b, and is managed with the boric acid corrosion and general condition monitoring AMPs. The staff agrees that this resolves RAI 3.1.1-1.

Table 3.1.2-1 of the LRA does not specify loss of material/wear for the closure head stud assembly as identified by NUREG-1801, Section IVA.2.1-d. Therefore, the applicant was requested in RAI 3.1.1-2 to include this aging effect and the corresponding aging management program (AMP XI.M3 of NUREG-1801 “Reactor Head Closure Studs”) in Table 3.1.2-1 of the LRA or provide justification for concluding that loss of material/wear is not an aging effect.

In response to RAI 3.1.1-2, in a letter dated December 3, 2004, the applicant stated that the closure head stud assembly does not experience relative motion other than normal stud removal and installation during refueling activities. These activities are closely monitored by procedure and any degradation is dispositioned by supplemental examination, corrective measures or repairs, analytical evaluation of the component function, or replacement of the component to ensure continued structural integrity and function of the component. There is no significant continuing wear to the reactor vessel closure studs that would lead to a loss of component function and require monitoring by an aging management program. Therefore, the applicant did not consider loss of material due to wear as an applicable aging effect for the closure head stud assembly. However, AMP XI.M3 of NUREG-1801 and RG 1.65 indicates that reactor closure studs are susceptible to loss of material due to wear. In addition, RG 1.65 recommends, and the applicant uses, coatings and lubrication which are used to reduce wear. Therefore, the staff requested that the LRA specify loss of material due to wear as an aging effect for the closure head stud assembly and specify the AMP to be applied.

In its response dated February 8, 2005 to supplemental RAI 3.1.1-2, the applicant stated that although wear of the reactor closure studs is not expected to affect the intended function of the bolting, loss of material due to wear will be considered as an aging effect consistent with NUREG-1801, item IV.A2.1-d. The aging effect will be managed by the inservice inspection program: systems, components and supports AMP. The staff finds this response acceptable since it has identified the applicable aging effect and provides an aging management program which requires inspection of the closure studs in accordance with the ASME Code requirements that are capable of detecting loss of material. This resolves RAI 3.1.1-2.

Table 3.1.2-1 of the LRA does not specify loss of fracture toughness/neutron irradiation embrittlement for the upper shell as identified by NUREG-1801, Section IVA.2.5-c. The applicant was requested in RAI 3.1.1-3 to include this aging effect and the corresponding aging management program (AMP XI.M31 of NUREG-1801 "Reactor Vessel Surveillance") in Table 3.1.2-1 of the LRA or provide justification for concluding that fracture toughness/neutron irradiation embrittlement is not an aging effect.

In response to RAI 3.1.1-3, in a letter dated December 3, 2004, the applicant stated loss of fracture toughness due to neutron irradiation embrittlement is an applicable aging effect for those reactor pressure vessel subcomponents exposed to a neutron fluence greater than $1x10^{17}$ n/cm^2 (E>1Mev). This threshold level of fluence is experienced by the beltline region subcomponents identified in LRA Table 3.1.2-1 as susceptible to loss of fracture toughness. Based on a supplemental evaluation performed by the applicant, the upper shell and primary outlet nozzles are subjected to loss of fracture toughness due to neutron irradiation embrittlement and will be managed with the reactor vessel surveillance AMP. In addition, the applicant's response to RAI 4.2.2-1 stated that an assessment has been performed to address an expansion of the Millstone Unit 2 reactor pressure vessel beltline region resulting from the period of extended operation. This assessment was used to evaluate all materials that were determined to exceed the $1.0x10^{17}$ n/cm^2 (E>1.0 MeV) boundary.

The applicant provided results for the upper/intermediate circumferential welds, but not for the upper shell and primary outlet nozzles that are subject to loss of fracture toughness due to neutron irradiation embrittlement. Based on the information provided by the LRA and the applicant's responses to RAIs 3.1.1-3 and 4.2.2-1, the staff notes that the applicant did not provide the USE and PTS evaluations for these reactor pressure vessel subcomponents as required by Appendix G to10 CFR Part 50, and 10 CFR 50.61, respectively.
Therefore to confirm that the USE and PTS evaluations for these subcomponents meet regulatory requirements at the end of the period of extended operation, the staff requests the applicant to include the USE and PTS evaluation (similar to the data currently in Tables 1 and 2 of the FSAR for the other reactor vessel subcomponents) for the upper shell and primary nozzles and their associated welds into Tables 1 and 2 of the Millstone Unit 2 FSAR supplement and determine the effect on the limiting materials.

In response to supplemental RAI 3.1.1-3, in a letter dated February 8, 2005, the applicant provide the USE and PTS evaluations for the upper shell and primary nozzles, and their associated welds. The applicant calculated the USE values for these materials in accordance with 10 CFR Part 50, Appendix G, and performed the PTS evaluation in accordance with 10 CFR 50.61 through the extended period of operation. The USE and PTS values for these subcomponents were also included in Tables 3.1.1-3-1 through 3.1.1-3-4 in the applicant's response for both units. The results of the USE and PTS evaluations on these expanded beltline regions had no effect on the limiting material. The staff confirmed that the limiting material previously identified in the LRA is still valid. Therefore, since the applicant evaluated all materials that were determined to exceed the $1.0x10^{17}$ n/cm^2 (E>1.0 MeV) boundary and identified that the limiting material specified in sections 4.2.2 and 4.2.3 of this SER is still valid, the staff finds this response acceptable. In addition, the level of detail described in the FSAR supplement follows the recommendations of NUREG-1800, Table 4.2-1. This resolves RAI 3.1.1-3.

Table 3.1.2-1 of the LRA does not specify loss of material/wear for the vessel flange and core support ledge as identified by NUREG-1801, Section IVA.2.5-f. Therefore, the applicant was requested in RAI 3.1.2-1 to include the aging effect and the corresponding aging management program described in NUREG-1801 (AMP XI.M1, “Inservice inspection”) in the LRA or provide justification for concluding that loss of material/wear is not an aging effect.

In its response to RAI 3.1.2-1, dated December 3, 2004, the applicant stated that loss of material due to wear was not considered an applicable aging effect for the reactor vessel flange and core support ledge since they do not experience relative motion other than normal reactor disassembly and reassembly during refueling activities. These activities are closely monitored by procedure and any degradation is dispositioned by supplemental examination, corrective measures or repairs, analytical evaluation of the component function, or replacement of the component to ensure continued structural integrity and function of the component. The applicant also stated that there is no significant continuing wear to the reactor vessel flange and core support ledge that would lead to a loss of component function that would require monitoring by an aging management program. However, the staff considers wear to be an aging effect as identified by NUREG-1801, Section IVA.2.5-f, because the reactor vessel flange and support ledge do experience relative motion during reactor disassembly and reassembly during refueling activities. This aging effect should then be monitored. Since the applicant stated this refueling activity is monitored by procedures, some type of inspection should be performed to monitor wear of these components. Therefore, the staff requested that the LRA specify loss of material due to wear as an aging effect for the reactor vessel flange and core support ledge. In addition, the applicant was requested to discuss the inspections performed by the refueling activity procedures that monitor wear for these components or include the corresponding aging management program recommended by NUREG-1801 (AMP XI.M1, “Inservice Inspection”).

In its response to supplemental RAI 3.1.2-1 dated February 8, 2005, the applicant stated that although wear of the reactor vessel flange and core support ledge is not expected to affect the intended function of these components, loss of material due to wear will be considered as an aging effect consistent with NUREG-1801, Item IV.A2.5-f. The aging effect will be managed by the Millstone inservice inspection program: reactor vessels internals AMP. The staff finds this response acceptable since it has identified the applicable aging effect along with an appropriate aging management program that is consistent with NUREG-1801 for these components. This resolves RAI 3.1.2-1.

In Table 3.1.2-1, the applicant has identified cracking as an aging effect requiring management for the CEDM pressure boundary components and the vessel head penetration components manufactured from stainless steel and nickel-based alloys that are exposed to treated water. The aging effect is managed by the inservice inspection program: systems, components and supports, and the chemistry control for primary systems program. The aging effect, material, and the environment is consistent with NUREG 1801, Item IV.A2.2-a and Item IV.A2.2-b and no further evaluation is required. The staff notes that the inservice inspection program: systems, components and supports includes nickel-alloy nozzles and penetrations program. This program is used to manage PWSCC of nickel alloys. The staff concludes the inservice inspection program: systems, components and supports (which includes the nickel-alloy nozzles and penetrations program) and the chemistry control for primary systems program will be effective in managing cracking for the CEDM pressure boundary components and the vessel head penetrations.

Based on the above information, the staff finds the applicant's management of cracking to be acceptable.

In Table 3.1.2-1, the applicant also identified loss of material as an aging effect requiring management for the CEDM pressure boundary components and the vessel head penetration components manufactured from stainless steel and nickel-based alloys that are exposed to treated water. The applicant stated the aging effect is managed by the chemistry control for primary systems program. The aging effect, material, and the environment is not addressed in NUREG 1801 for Item IV.A2.2-a and Item IV.A2.2-b. In RAI 3.1-A-1 the staff requested that the applicant provide justification on why the chemistry control for primary systems program alone is sufficient to manage loss of material without the need to credit an inspection-based AMP to verify that the chemistry control program is accomplishing its mitigative aging management function.

In response to RAI 3.1-A-1, in a letter dated December 3, 2004, the applicant stated that the stainless steel and nickel-based alloy materials exposed internally to primary treated water are not expected to be subject to significant loss of material as a result of corrosion. In addition, NUREG-1801 does not identify loss of material due to corrosion as an aging effect requiring management for these materials in the RCS. However, loss of material was conservatively considered in the Millstone LRA for the RCS components in the primary water environment. The chemistry control for primary systems program provides reasonable assurance that loss of material resulting from corrosion will not prevent these components from performing their intended functions.

Verification of the effectiveness of the chemistry control for primary systems program is provided by the work control process as described in LRA Appendix B, Section B2.1.5. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. The corrective actions program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

In Unit 2 LRA Table 3.1.2-1, the applicant identified no aging effects for the following stainless steel and nickel-based alloy reactor vessel component types exposed externally to air: CEDM head penetration nozzle, CEDM head penetration nozzle flange, CEDM pressure housings, head vent pipe, and instrument tubes. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high-temperature internal flow, which creates a dry air environment. Stainless steel and nickel-based alloy components in a dry air environment are not susceptible to general corrosion that would affect their intended function. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in a dry air environment. This resolves RAI 3.1-A-1.

In Unit 2 LRA Table 3.1.2-1, the applicant proposed using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” to manage loss of material for the following stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel component types of the reactor vessel exposed internally to treated, borated water: core stabilizing lugs and core stop lugs, flow skirt flow baffle, and surveillance capsule holders; CEDM head penetration nozzle, CEDM head penetration nozzle flange, CEDM pressure housings, CEDM head dome, CEDM head flange, instrument tubes, instrument tube flange and studs/nuts/washers, head vent pipe, primary inlet/outlet nozzle and safe-end, bottom head, upper shell, and vessel flange and core support ledge. The staff accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 3.0.3.2.2 of this SER.

In Unit 2 LRA Table 3.1.2-1, for each of these same component and material combinations, the applicant is also managing cracking using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” MPS AMP B2.1.18 is also credited with managing PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals. The staff accepted the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program, and its evaluation of these programs is documented in Section 3.0.3.2.2 and Section 3.0.3.2.13 of this SER, respectively. The Alloy 600 base metal and Alloy 82/182 weld metals PWSCC management portion of the AMP has been reviewed and the staff’s evaluation of this program is documented in Section 3 of this SER. The staff finds that the applicant managed cracking in a manner consistent with the GALL Report.

On the basis that cracking of stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel and nickel-based alloy components are not significant in chemically treated, borated water, the staff finds that management of loss of material using water chemistry control is adequate.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3.2 Reactor Vessel Internals - Aging Management Evaluation - Table 3.1.2-2

In Section 3.1.2.1.2 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor vessel internals and associated pressure boundary components:

- chemistry control for primary systems program
- inservice inspection program: reactor vessel internals

In Table 3.1.2-2 of the LRA, the applicant provided a summary of AMRs for the reactor vessel internals and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed Unit 2 LRA Table 3.1.2-2, which summarized the results of AMR evaluations for the reactor vessel internals component groups.

Table 3.1.2-2 of the LRA did not specify loss of fracture toughness/neutron irradiation embrittlement for the core support barrel upper flange as identified by Section IVB.3.3-a. Therefore, the applicant was requested in RAI 3.1.2-2 to include the aging effect and the corresponding aging management program (AMP XI.M16 of NUREG-1801 "PWR Vessel Internals") in the LRA or provide justification for concluding that fracture toughness/neutron irradiation embrittlement is not an aging effect.

In response to RAI 3.1.2-2, in a letter dated December 3, 2004, the applicant stated that due to the location of the stainless steel core support barrel upper flange, and the distance from the reactor core, loss of fracture toughness due to irradiation embrittlement is not expected to be significant. However, as part of the aging management program for the reactor vessel internals, Dominion has committed to follow the industry efforts related to internals aging issues, including neutron irradiation embrittlement. This commitment is described in LRA Appendix B, Section B2.1.17 "Inservice Inspection Program: Reactor Vessel Internals" and in LRA Appendix A, Table A6.0-1, Item 13, in a letter to NRC, S/N: 04-320 dated July 7, 2004. The staff finds this acceptable since the applicant commits to follow the industry efforts for neutron irradiation embrittlement for the applicable reactor vessel internals. This resolves RAI 3.1.2-2.

Table 3.1.2-2 of the LRA did not specify the loose parts monitoring AMP to manage the loss of preload/stress relaxation aging effect for the CEA shroud bolts as identified by NUREG-1801, Section IVB.3.2-g. Therefore, the applicant was requested in RAI 3.1.2-3 to provide this aging management program or provide justification for not including this AMP.

In response to RAI 3.1.2-3, in a letter dated December 3, 2004, the applicant stated that the bolted connections in the reactor vessel internals are managed by the effects of loss of preload by the inservice inspection program: reactor vessel internals AMP. This AMP provides for inspection of the internals in accordance with examination category B-N-3 of the ASME Code, Section XI, Subsection IWB.

These inspections include VT-3 examinations of the bolted connections to detect a gross loss of preload, such as looseness and improper fit, prior to failure of the connection. Therefore, the applicant does not rely upon the loose parts monitoring program as suggested in NUREG-1801 since this approach would require failure of the bolting in order to be effective. The staff finds this acceptable since the applicant is using inspections to prevent the failure of the bolted connections, and the use of the inspection in the inservice inspection program: reactor vessel internals AMP provides reasonable assurance that degradation would be detected prior to the loss of the intended function. This resolves RAI 3.1.2-3.

Table 3.1.2-2 of the Millstone Unit 2 LRA specified core support barrel snubber assemblies with the following aging effects: void swelling, loss of fracture toughness, and loss of material/wear. Figure 3.3-12 of the FSAR shows bolts for this assembly. In RAI 3.1.2-4, the applicant was requested to clarify if these aging effects also apply to the bolts. In addition, the applicant was requested to provide the associated AMPs or justification for concluding that these bolts are not subject to these aging effects. Also, the applicant was asked if loss of preload is an aging effect on these bolts. The appropriate AMP or justification for concluding that these bolts are not subject to loss of preload should be provided.

In response to RAI 3.1.2-4, in a letter dated December 3, 2004, the applicant stated the aging effects shown in the Millstone Unit 2 LRA, Table 3.1.2-2 for the core support barrel snubber assemblies applied to all parts of the assembly, including the bolts. The applicable aging management programs are the inservice inspection program: reactor vessel internals AMP and the chemistry control for primary systems program. The loss of preload aging effect was inadvertently omitted from LRA Table 3.1.2-2 for this assembly. The inservice inspection program: reactor vessel internals AMP manages loss of preload for this bolting through VT-3 examinations in accordance with examination category B-N-3. The staff finds this acceptable since the applicant identified the applicable aging effects for the whole snubber assembly and manages these aging effects in accordance with the ASME Code and NUREG-1801.
This resolves RAI 3.1.2-4.

Table 3.1.2-2 of the Millstone Unit 2 LRA specified core shroud assembly fabricated from stainless steel. Figure 3.3-13 of the FSAR showed the core shroud assembly consists of a lower segment and an upper segment joined by tie rod assemblies. Therefore, in RAI 3.1.2-5, the applicant was requested to clarify if there are welds in the individual segments of the core shroud. If the core shroud segments are bolted, provide the aging effects, including loss of preload for these core shroud assembly bolts and the associated AMP. If these core shroud segments are welded, the applicant was asked if the welds and adjacent base material susceptible to irradiation assisted stress corrosion cracking (IASCC). In addition, the applicant was requested to provide the appropriate AMP for IASCC (including type of inspection, inspection frequency and acceptance criteria) or provide justification for concluding that these welds and adjacent base material are not susceptible to IASCC.

In response to RAI 3.1.2-5, in a letter dated December 3, 2004, the applicant stated the Millstone Unit 2 core shroud assembly upper segment and lower segment are weldments and do not include bolting. The welds are included as part of the core shroud assembly subcomponent in LRA Table 3.1.2-2 and are subjected to the aging effects identified for this subcomponent, which includes cracking (stress corrosion cracking, irradiation-assisted stress corrosion cracking) consistent with NUREG-1801, Item IV.B3.4-a. Cracking will be managed by the inservice inspection program: reactor vessel internals AMP and the chemistry control for primary systems program. The staff finds this acceptable since the applicant has identified the applicable aging effects for its design of the core shroud assembly and is managed in accordance with the recommendations of NUREG-1801. This resolves RAI 3.1.2-5.

Section 3.1.2.2.7.1 of the LRA stated that the reactor vessel flange leak detection line is not within the scope of license renewal because it does not meet the criteria of 10 CFR 54.4(a) as an intended function. However, NUREG-1801, Section IV A.2.1-f identifies that this component is subject to a crack initiation and growth/stress corrosion cracking aging mechanism. Therefore, the applicant was requested in RAI 3.1.2-6 to provide a plant-specific aging management program as identified by NUREG-1801 for cracking of this component.

In response to RAI 3.1.2-6, in a letter dated December 3, 2004, the applicant stated the reactor vessel leak detection system, including the leak detection line, is not within the scope of license renewal. As stated on page 3-18 in the Millstone Unit 2 LRA, the reactor vessel closure head and shell flanges are sealed by inner and outer hollow metallic O-rings.

Any leakage through this seal arrangement is directed to the leakage detection system through a 3/16-inch hole in the vessel flange. Leakage flow past the inner reactor vessel flange O-ring is limited in the event of seal failure by the 3/16-inch diameter hole in the reactor vessel flange which is smaller than the inside diameter of the leak detection line. Additionally, the potential flowrate through the 3/16-inch diameter hole in the flange is within the normal make-up capability of the chemical and volume control system such that the leak detection system doses not constitute the RCS pressure boundary. The failure of the leak detection system components has been evaluated and cannot affect the function of safety-related systems, structures or components. As such, the reactor vessel flange seal leak detection system, including the leak detection line does not meet the criteria of 10 CFR 54.4(a) and is not within the scope of license renewal. Therefore, the system is not subject to aging management review and there is no aging management program applicable to the leak detection line. The staff review to determine if this was acceptable was identified as Open Item 3.1.2-6.

In response to Open Item 3.1.2-6, in a letter dated April 1, 2005, the applicant revised its position and has now included the leak detection components within the scope of license renewal. In addition, the applicant stated that the leak detection system consists of piping, tubing, and valves that are long-lived, passive components and are consistent with the existing component types in the reactor coolant system included in LRA Table 2.3.1-3. These stainless steel components are exposed to a treated water environment and are managed for loss of material and cracking aging effects by the chemistry program for primary systems AMP and the inservice inspection program: systems, components, and supports as indicated for piping, tubing, and valves component types in LRA Table 3.1.2-3. The applicant noted that the loss of fracture toughness aging effect listed in Table 3.2.1-3 is not applicable to these valves since the valves are not CASS.

Based on the applicant's inclusion of the leak detection components within the scope of license renewal, Open Item 3.1.2-6 is closed.

Table 3.1.2-2 of the Millstone Unit 2 LRA did not specify a hold-down ring that is subject to loss of material/wear. The applicant was requested in RAI 3.1.2-7 to include this aging effect and the necessary aging management programs in the LRA for this component as recommended by NUREG-1801, item IV.B.3.1.4.

In response to RAI 3.1.2-7, in a letter dated December 3, 2004, the applicant stated that it uses the terminology "Expansion Compensating Ring" in LRA Table 3.1.2-2 in lieu of hold-down ring for the Millstone Unit 2 reactor vessel internals. Since the applicant includes this subcomponent in the LRA and manages the loss of material aging effect in accordance with NUREG-1801, item IV.B.3.1.4, the staff finds this response acceptable. This resolves RAI 3.1.2-7.

Table 3.1.2-2 of the Millstone Unit 2 LRA did not specify core shroud assembly bolts that are subject to fatigue, cracking, void swelling, loss of fracture toughness, and loss of preload. The applicant was requested in RAI 3.1.2-8 to include these aging effects and the necessary aging management programs in the LRA for this component as recommended by NUREG-1801, item IV.B.3.4.2.

In response to RAI 3.1.2-8, in a letter dated December 3, 2004, the applicant stated that the core shroud assembly for the Millstone Unit 2 reactor vessel internals utilizes welded construction and there are no core shroud assembly bolts. As discussed in RAI 3.1.2-5, the core shroud assembly upper segment and lower segment are weldments and do not include bolting. The two core shroud assemblies are connected using tie rod assemblies. Both of these assemblies are included in the LRA along with the applicable aging management programs in accordance with NUREG-1801. Therefore, since the core shroud design does not include core shroud assembly bolts, the staff finds the applicant's response acceptable. This resolves RAI 3.1.2-8.

Table 3.1.2-2 of the Millstone Unit 2 LRA did not specify core support column bolts that are subject to fatigue, cracking/IASCC, void swelling, and loss of fracture toughness. The applicant was requested in RAI 3.1.2-9 to include these aging effects and the necessary aging management programs in the LRA for this component as recommended by NUREG-1801, item IV.B.3.5.5.

In response to RAI 3.1.2-9, in a letter dated December 3, 2004, the applicant stated that the core support columns for the Millstone Unit 2 reactor vessel internals utilize welded construction and there are no core support column bolts. Therefore, NUREG-1801, item IV.B.3.5.5 is not applicable. The core support columns are identified in the LRA along with the applicable aging effects and aging management programs in accordance with NUREG-1801, and therefore the staff finds the applicant's response acceptable. This resolves RAI 3.1.2-9.

In Unit 2 LRA Table 3.1.2-2, the applicant proposed to manage loss of material for the following stainless steel component types of the reactor vessel internals system - control element assembly (CEA) shroud assembly components such as CEA shroud extension shaft guides, CEA shrouds - dual, CEA shrouds - single, core shroud assembly, core shroud tie rods, core support barrel, core support barrel alignment keys, core support barrel snubber assemblies, core support barrel upper flange, core support columns, core support plate, expansion compensating ring, fuel alignment pins, fuel alignment plate, fuel alignment plate guide lugs and guide lug inserts, incore instrumentation (ICI) support plate and guide tubes, lower support structure beam assemblies, and upper guide structure support plate - exposed internally to treated, borated water using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The staff accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 3.0.3.2.2 of this SER.

In LRA Table 3.1.2-2, for each of these same component and material combinations, the applicant stated that it is also managing cracking using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," and MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." MPS AMP B2.1.17 credits the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspections and additional examinations based on future industry developments. The staff reviewed the embrittlement effects on the CASS portion of the inservice inspection program: reactor vessel internal program, and its evaluation of this part of the program is documented in Section 3.0.3.2.12 of this SER. The evaluation of aging management of such issues as void swelling (change in dimensions), stress corrosion cracking (PWSCC and IGSCC) and loss of preload for the reactor vessel internals components have been reviewed and the evaluation is documented in Section 3 of this SER. The staff finds that the applicant managed cracking in a manner consistent with the GALL Report. In addition, the staff reviewed the applicable part of MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," which discusses the ASME Section XI, Subsection IWB, Category B-N-3 portion of the inservice inspection program. The staff accepted the inservice inspection program: systems, components and supports program and its evaluation of this program is documented in Section 3.0.3.2.13 of this SER.

On the basis that cracking of stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated, borated water, the staff finds that management of loss of material using water chemistry control is adequate.

The GALL Report recommends a loose parts monitoring program to manage loss of mechanical closure integrity for CEA shroud extension shaft guides, cylinders, and bases; shroud base; shroud flow channel; shroud flow channel cap; shroud shaft retention pin; shroud retention block; spanner nuts; shroud fasteners; guide tubes; ICI thimble support plate assembly; ICI support plate, grid, lifting support, lifting plate, column, plates, and funnel; pad, ring, nipple, hex bolt, and spacer; and threaded rod, hex jam nut, thimble support nut, cap screws, and reactor vessel internals.

In the Unit 2 LRA, the applicant proposed to manage this aging effect using the MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The staff reviewed and accepted the inservice inspection program: reactor vessel internals program and its evaluation of this program is documented in Section 3.0.3.2.12 of this SER.

On the basis that the inservice inspection program: reactor vessel internals program detects aging effects prior to the loss of mechanical integrity of these components, the staff finds that the use of this program in lieu of a loose parts monitoring program is acceptable.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3.3 Reactor Coolant - Aging Management Evaluation - Table 3.1.2-3

In Section 3.1.2.1.3 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor coolant system and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- closed-cycle cooling water system
- general condition monitoring
- inservice inspection program: systems, components and supports
- work control process

In Table 3.1.2-3 of the LRA, the applicant provided a summary of AMRs for the reactor coolant system and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed the Unit 2 LRA Table 3.1.2-3, which summarized the results of AMR evaluations for the RCS component group.

In Unit 2 LRA Table 3.1.2-3, the applicant identified no aging effects for the following stainless steel, nickel-based alloy, and carbon steel component types exposed externally to air for the RCS: flow orifices, piping, tubing, valve; pressurizer nozzles, safe-ends and instruments and heaters (sheaths and sleeves), manway cover and insert; quench tank, reactor coolant pump (RCP) seal coolers, RCP thermal barriers, RCP casing, RCP rupture disks. Air is not identified in the GALL Report as an environment for these components and materials.

In the Unit 2 LRA, the applicant stated that the RCS stainless steel components are externally insulated. The applicant's FSAR concludes (page 5-6) that the use of external thermal insulation on RCS components in conformance with RG 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel," dated December 1973, provided reasonable assurance that the reactor coolant pressure boundary material will be adequately protected from conditions that would lead to loss of integrity from stress corrosion. Based on its review of the applicant's FSAR, the staff agreed with the applicant that the RCS stainless steel components are adequately protected from conditions that could lead to loss of integrity from stress corrosion.

On the basis of its review of current industry research and operating experience, the staff finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high-temperature internal flow, which creates a high-temperature dry air environment, and general corrosion is not likely to occur under such an environment. Additionally, stainless steel and nickel-based alloy in a dry air environment are not susceptible to general corrosion that would affect the intended function of components. The only carbon steel component is the pressurizer manway cover and insert, which is inspected each time the manway is opened. Therefore, the staff concluded that there are no applicable aging effects requiring management for metal in a dry air environment.

In Unit 2 LRA Table 3.1.2-3, the applicant identified the RCP seal cooler inner tube exposed to borated treated water as subject to cracking which is being managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." During the audit and review, the staff asked the applicant what other means are used to manage cracking and to explain the consequence of the inner tube cracking on safety functions. The applicant responded that in the event cracking does occur, the radiation monitors in the reactor building closed cooling water (RBCCW) system will detect activity and a corrective action report will be initiated to correct the condition. The applicant also stated to the staff that a plant modification has been implemented to address the inter-system loss-of-coolant accident (LOCA) concern of the RCP seal cooler (inner tube) failing. Furthermore, the applicant's FSAR Section 9.4.3.2 described the relief valves that were added to protect the RBCCW system from an inter-system LOCA from a RCP seal cooler (inner tube) failure.

In an LRA supplement letter dated July 7, 2004, the applicant stated that for RCP seal cooler (inner tube) exposed to treated water subject to cracking, which is being managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," the GALL Report match for the RCP seal cooler (inner tube) (Unit 2 LRA page 3-82) should be changed to "None." In addition, Note E will be changed to Note H and a new plant-specific note will be added that states the following:

> Cracking of the component group "RCP Seal Cooler (Inner Tube)" is managed by Primary Water Chemistry. However, there are additional means for detecting cracking. The additional means consist of monitoring the radiation monitors in the RBCCW System and chemistry sampling of the RBCCW.

On the basis that inservice inspection is not feasible, the staff reviewed the applicant's FSAR and determined that the applicant has demonstrated that the cracking will be adequately managed by the primary water chemistry control program and radiation monitoring in the RBCCW system.

In Unit 2 LRA Table 3.1.2-3 (page 3-83), the applicant stated that the CASS RCP thermal barrier exposed to treated water with aging effect of cracking is to be managed by the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program. The staff asked the applicant to clarify which part of the inservice inspection program is being credited with managing the aging effect for the RCP thermal barrier. The applicant responded that it was confirmed with the inservice inspection coordinator that the inservice inspection program does not perform examinations associated with the thermal barriers. The work control process program is credited for managing the effects of aging for the RCP thermal barriers. The RCPs are refurbished, designated as spares, and reinstalled during future outages. Examples of work orders are identified where, through the work control process program, the thermal barriers associated with spare RCPs are blown down of the closed cooling water and a sample of the closed cooling water is taken.

The applicant submitted an LRA supplement letter, dated July 7, 2004, which stated the following in response to the staff's request for clarification:

> Note 6 should be added for Unit 2 LRA Table 3.1.2-3 (page 3-83) for the RCS component group 'RCP Thermal Barriers' and aging effect 'Loss of Fracture Toughness.' The Note for this item is revised by Item 42-1 of this clarification letter and is applicable to this component because it is CASS material.
>
> The "Inservice Inspection Program: Systems, Components and Supports" should be replaced by the "Work Control Process" for Unit 2 LRA Table 3.1.2-3 (page 3-83), for the RCS component group 'RCP Thermal Barriers' and aging effect 'Cracking.' The Note for this item should be "E" in the Unit 2 LRA. Also, the "Discussion" column in Unit 2 Table 3.1.1, Item 3.1.1-36 (page 3-33), should read as follows:
>
>> Not consistent with NUREG-1801. Cracking is managed with the chemistry control for primary systems program and the inservice inspection program: systems, components and supports except for the RCP thermal barriers, which are managed with chemistry, and the work control process. These programs take some exceptions to the NUREG-1801 AMPs.

The staff reviewed the work control process program and Specification SP-EE-364, "Specification for Refurbishment of a Millstone Unit 2 Reactor Coolant Pump Motor," Revision 1, dated July 7, 1996, and determined that the applicant has demonstrated that the effects of aging of RCP thermal barriers will be adequately managed.

In Unit 2 LRA Table 3.1.2-3 (page 3-79), the applicant stated that for the pressurizer spray head assembly/nozzle assembly component type of nickel-based alloy material in a treated water and steam environment, the applicant credits the chemistry control for primary systems program to manage cracking. The staff asked the applicant to provide justification regarding how PWSCC can be managed by the chemistry control for primary systems program alone. The applicant responded that it intends to replace the Unit 2 pressurizer during the fall 2006 refueling outage.

The replacement will be fabricated with PWSCC resistant materials as described in a letter dated June 3, 2004.

The staff reviewed the letter and determined that the aging effect of PWSCC will be reduced on the basis of a new replacement pressurizer fabricated with increased PWSCC resistant materials.

Table 3.1.2-3 of the LRA specifies the use of AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” for closure bolting in the RCP, valves and pressurizer manways. In addition, Section B2.0 of Appendix B of the LRA states that the aging management review did not identify the need for the “Bolting Integrity” AMP. However, NUREG-1801, Sections IVC2.3-e, IVC2.3-g, IVC2.4-e, IVC2.4-g, IVC2.5-n and IVC2.5-p specifies the use of AMP XI.M18, “Bolting Integrity” for these components. AMP XI.M18 of NUREG-1801 incorporates the requirements and guidelines of NUREG-1339, EPRI NP-5769 and EPRI TR-104213 concerning material selection, bolting preload control, inservice inspections, plant operation and maintenance, and evaluation of the structural integrity of bolted joints. Therefore, the applicant was requested in RAI 3.1.1-1 to provide the bolting integrity AMP as identified by NUREG-1801, or include all of the necessary information discussed above into AMP B2.1.18 of the LRA.

In response to RAI 3.1.3-1, in a letter dated December 3, 2004, the applicant stated that it has developed a specific bolting integrity AMP to manage the aging effects for closure bolting in the reactor coolant pump, valves and pressurizer manway. This response is acceptable since the applicant will manage the closure bolting of these components with a bolting integrity AMP as specified in NUREG-1801. The bolting integrity AMP is evaluated in Section 3.0.3.2.18 of this SER. This resolves RAI 3.1.3-1.

For the CASS spray head assembly identified in Table 3.1.2-3 of the LRA, the applicant specified the chemistry control AMP to manage cracking. NUREG-1801, Section IVC2.5-j, recommends a plant-specific AMP to be used to manage cracking. Therefore, the applicant was requested in RAI 3.1.3-2 to provide this AMP to the NRC for evaluation as recommended by NUREG-1801, Section IVC2.5-j.

In response to RAI 3.1.3-2, in a letter dated December 3, 2004, the applicant stated that material for the Millstone Unit 2 pressurizer spray head is a nickel-based alloy and not CASS. The plant-specific aging management program for managing the aging effects associated with the pressurizer spray head is the chemistry control for primary systems program.
In addition, Dominion intends to replace the Unit 2 pressurizer during the fall 2006 refueling outage. The replacement pressurizer will be constructed of PWSCC-resistant materials. The replacement of the pressurizer is also discussed in the evaluation of AMP B2.1.18. In response to RAI B2.1.18-1, also in the dated December 3, 2004, letter, the applicant stated that Dominion intends to replace the pressurizer during the fall of 2006 refueling outage for Millstone Unit 2 using materials that are resistant to PWSCC, as documented in its letter dated June 3, 2004. To track this commitment, the applicant is requested to revise the List of Commitments (Table A6.0-1 of Appendix A to the Millstone Unit 2 LRA) to include the commitment that the Millstone Unit 2 pressurizer will be replaced in fall 2006 with material resistant to PWSCC (i.e. Alloy 690 and 52/152). This is evaluated in Section 3.0.3.2.13 of this SER. This resolves RAI 3.1.3-2.

Table 3.1.2-3 of the Millstone Unit 2 LRA does not specify the pressurizer integral support that is subject to fatigue, cracking/IASCC, and boric acid corrosion. The applicant was requested in

RAI 3.1.3-4 to include these aging effects and provide the necessary aging management programs in the LRA for this component as recommended by NUREG-1801, item IV.C.2.5.12.

In response to RAI 3.1.3-4, in a letter dated December 3, 2004, the applicant stated that the integral supports identified in NUREG-1801 are considered to be the same as the component type “Pressurizer (Seismic and Valve Support Lugs)” and “Pressurizer (Support Skirt and Flange)” in the Millstone Unit 2 LRA, Table 3.1.2-3. The aging effects of loss of material due to boric acid corrosion and cracking are identified for these components consistent with NUREG-1801, Item IV.C.2.5.12. Fatigue is addressed as a TLAA and is identified in LRA Table 3.1.1, item 3.1.1-10. Since the pressurizer seismic lugs, support skirt, and flange are the integral supports, and are identified in the LRA along with the applicable AMPs consistent with NUREG-1801, the staff finds this response acceptable. This resolves RAI 3.1.3-4.

On the basis of its review, the staff concludes that the applicant has adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the pressurizer, such that there is reasonable assurance that the component intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3.4 Steam Generators Summary of Aging Management - Table 3.1.2-4

In Section 3.1.2.1.4 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the steam generator and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- chemistry control for secondary systems program
- flow-accelerated corrosion
- inservice inspection program: systems, components and supports
- steam generator structural integrity
- work control process

In Table 3.1.2-4 of the LRA, the applicant provided a summary of AMRs for the steam generator and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The applicant replaced the two steam generators (SGs) at Millstone Unit 2 in 1993 with replacement SGs fabricated by Babcock and Wilcox International. Each replacement SG nominally contains 8,523 thermally treated Alloy 690 tubes. Thermally treated Alloy 690 tubes have been shown in laboratory tests and operating nuclear power plants to be more resistant to PWSCC and outside diameter stress corrosion cracking (ODSCC) than the original mill annealed Alloy 600 tubes. Each tube has a nominal outside diameter of 0.750-inch and a nominal wall thickness of 0.0445-inch. The tubes were hydraulically expanded at both ends for the full length of the tubesheet and are supported by a number of Type 410 stainless steel tube support plates with a lattice arrangement. The U-bends of the tubes installed in rows 1 through 8 were thermally stress-relieved after bending.

The staff reviewed Table 3.1.2-4 of the Unit 2 LRA, which summarized the results of AMR evaluations for the steam generator component groups.

In LRA Table 3.1.2-4, the applicant identified the inservice inspection program as the AMP to manage the aging effect of cracking in the SG base support and flange, support brackets and lugs for Unit 2. In RAI 3.1.2-4-1, the staff asked the applicant to provide details for some of the AMP attributes (e.g., preventive actions, parameters monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) for these components since they are not addressed in the GALL inservice inspection AMP.

By letter dated December 3, 2004, the applicant responded that in GALL AMP XI.M1, the program scope of the inservice inspection AMP includes “all pressure retaining components and their integrally welded attachments.” The integral weld attachment of the base support to the steam generators is included under ASME Section XI, Subsection IWB. The flange, support brackets and lugs are included under ASME Section XI, Subsection IWF. In LRA Appendix B Table B2.0, the applicant lists all the GALL AMPs and the designated Millstone AMP that meets the GALL requirements. In Table B2.0, the applicant stated that the inservice inspection AMP will address GALL Section XI.M1, ASME Section XI Inservice Inspections, Subsection IWB, IWC and IWD and Section XI.S3, ASME Section XI, Subsection IWF (for supports). Since the program elements in NUREG-1801, XI.M1 and XI.S3 are both addressed by the Millstone inservice inspection AMP, the applicant stated that they do not need to describe separately the attributes mentioned above. The staff finds the applicant’s response acceptable because the applicant has clarified that the GALL inservice inspection AMP attributes for the base support flange, support brackets and lugs are addressed in the applicant’s Inservice Inspection AMP.

In LRA Table 3.1.2-4, the applicant identifies cracking as the aging effect for the primary instrument nozzles and tube plugs under treated water. In RAI 3.1.2-4-2, the staff asked the applicant to identify the mechanism for cracking in the primary instrument nozzles and tube plugs (e.g., PWSCC or ODSCC).

By letter dated December 3, 2004, the applicant responded that consistent with GALL, the cracking mechanism for the primary instrument nozzles and tube plugs subcomponents is PWSCC. The staff finds the applicant’s response acceptable because the applicant clarified that the aging mechanism for the primary instrument nozzles and tube plugs is PWSCC, consistent with what is stated in GALL.

In LRA Table 3.1.2-4, the applicant identified cracking as an aging effect and the inservice inspection as the AMP for the primary manway bolting in the air environment. In RAI 3.1.2-4-3, the staff asked the applicant to clarify the aging mechanism for cracking and to explain how the inservice Inspection AMP is used to manage this aging effect similar to the recommended bolting integrity AMP in the GALL.

By letter dated December 3, 2004, the applicant responded that consistent with GALL, the aging mechanism for the primary manway bolting is stress corrosion cracking, which can result from flaw initiation and growth. The applicant stated that it will implement a bolting integrity program to manage the aging effect of stress corrosion cracking as stated in GALL IV.D1.1-I. The staff finds the applicant’s response acceptable because it is consistent with GALL.

In LRA Table 3.1.2-4, the applicant identified the only aging effect as cracking and the inservice inspection program as the AMP for the secondary manway and handhole bolting in the air environment. In RAI 3.1.2-4-4, the staff asked the applicant to justify why loss of preload and stress relaxation are not applicable aging effects, as stated in GALL IV.D1.1-f.

By letter dated December 3, 2004, the applicant responded that loss of preload due to stress relaxation is not an applicable aging effect for the ASME Class 2 secondary manway and handhole bolting. The applicant uses SA-193, Grade B7 bolting for these applications. The applicant stated that, according to ASME Section II, Part D, Table 4, stress relaxation may occur at temperatures of 700 °F or higher for Grade B7 bolting materials. The applicant's normal operating reactor coolant system hot leg temperature, which bounds the maximum temperature for SG secondary side components, is 600.5 °F for Unit 2 and 618 °F for Unit 3.

The applicant stated that since these temperatures are below the 700 °F, loss of preload due to stress relaxation is not an aging effect requiring aging management. The staff reviewed the operating thresholds and footnotes for stress relaxation in Section II of the ASME Boiler and Pressure Vessel Code for these bolting materials and confirmed that the applicant's determination is valid. The staff finds the applicant's response acceptable because the bolts will not be exposed to temperatures in excess of the threshold for stress relaxation in the bolting materials.

In LRA Table 3.1.2-4, the applicant identified loss of material as the aging effect for the tube supports lattice rings. In RAI 3.1.2-4-5, the staff stated that cracking is also a potential aging effect and therefore asked the applicant to justify why cracking is not considered as an aging effect for the tube support lattice rings under treated water and steam.

By letter dated December 3, 2004, the applicant responded that only high-strength carbon steels are susceptible to this stress corrosion cracking in this environment. Since the tube support lattice rings are made of carbon steel and not high strength carbon steel, they are not susceptible to stress corrosion cracking under the steam generator secondary-side environment. The staff finds the applicant's response acceptable because based on operating experience, carbon steel is not likely to be susceptible to stress corrosion cracking under the steam generator secondary-side environment.

In Unit 2 LRA Table 3.1.2-4, the applicant identified no aging effects for the following nickel-based alloy, low-alloy steel, and carbon steel component types of the steam generator exposed externally to air: primary instrument nozzles, primary manway cover and diaphragm, secondary manway and handhole covers, secondary side nozzles, safe-ends, transition cone, upper and lower shell. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of the current industry research and operating experience, the staff finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air which is reactor building air environment. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Nickel-based alloy and stainless steel are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concluded that there are no applicable aging effects requiring management for these metals in a dry air environment.

In Unit 2 LRA Table 3.1.2-4, the applicant proposed to use water chemistry control programs to manage loss of material for the following stainless steel, carbon steel, low-alloy steel, and nickel-based alloy component types of the steam generator that are exposed to treated water/steam and borated water: divider plate; feedwater inlet ring and support; feedwater nozzle and safe-end; feedwater nozzle thermal sleeve; lower head; primary manway cover and diaphragm; primary nozzle and safe-end (and cladding); secondary manway and handhole covers; secondary side nozzle (except steam and feedwater); shroud; steam nozzle and safe-end; steam nozzle flow restrictor; top head; tube support lattice bars; tube support lattice support rings; tubesheet (and cladding); steam generator tube plugs; and steam generator U-tubes. Additionally, the tubesheet, steam generator U-tubes, and tube support lattice support rings also are managed by the steam generator structural integrity program. The staff accepted MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," and MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program," and its evaluation of these AMPs is documented in Section 3.0.3.2.2 and Section 3.0.3.2.3 of this SER, respectively. The steam generator structural integrity program has been reviewed and is evaluated in Section 3 of this SER.

On the basis of industry operating experience with these materials and use of a water chemistry control program consistent with the GALL Report, the staff finds this acceptable.

In the Unit 2 LRA Table 3.1.2-4, the applicant proposed to use water chemistry control programs to manage cracking for the following stainless steel component types of the steam generator that are exposed to borated water: divider plate, primary manway cover, and diaphragm. The applicant stated that the divider plate and primary manway are not inspected under the inservice inspection program; however, the components are inspected each time the manway is opened. The staff reviewed the applicant's specification SP-21172, "Inservice Inspection of SGs," and determined that the applicant adequately manages the aging effect.

The staff finds that management of cracking in low-alloy steel and carbon steel exposed to treated water using water chemistry control verified by inservice inspection is acceptable, as recommended by the GALL Report.

The staff finds that management of cracking in stainless steel exposed to treated water using water chemistry control is acceptable, as recommended by the GALL Report.

All other AMRs assigned to the staff in LRA Tables 3.1.2-1 through 3.1.2-4 were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report or not addressed in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.3 Conclusion

The staff concluded that the applicant provided sufficient information to demonstrate that the effects of aging for the of the reactor vessel, internals, reactor coolant system, and steam generator components and component types that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the reactor vessel, internals, and reactor coolant system components, as required by 10 CFR 54.21(d).

3.1B <u>Unit 3 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System</u>

This section of the SER documents the staff's review of the applicant's aging management review (AMR) results for the reactor vessel, internals, and reactor coolant system components and component groups associated with the following systems:

- reactor vessel
- reactor vessel internals
- reactor coolant system
- steam generator

3.1B.1 Summary of Technical Information in the Application

In LRA Section 3.1, the applicant provided AMR results for reactor vessel, internals, and reactor coolant system components and component groups. In LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the reactor vessel, internals, and reactor coolant system components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.1B.2 Staff Evaluation

The staff reviewed LRA Section 3.1 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the reactor system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMRs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff's audit evaluations are documented in the staff's MPS audit and review report and are summarized in Section 3.1B.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.1.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluation are documented in the MPS audit and review report and are summarized in Section 3.1B.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not addressed in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluation is documented in the MPS audit and review report and summarized in Section 3.1B.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.1B.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the reactor vessel, internals, and reactor coolant system components.

Table 3.1B-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.1 that are addressed in the GALL Report.

Table 3.1B-1 Staff Evaluation for Reactor Vessel, Internals, and Reactor Coolant System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor coolant pressure boundary components (Item Number 3.1.1-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue
Steam generator shell assembly (Item Number 3.1.1-02)	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry	Chemistry control for secondary systems program (B2.1.6); Inservice inspection program: systems, components, and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.2)
Pressure vessel ferritic materials that have a neutron fluence greater than 1.0E17 n/cm2 (E>1 MeV) (Item Number 3.1.1-04)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	TLAA	This TLAA is evaluated in Section 4.2, Reactor Vessel Neutron Embrittlement.

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor vessel beltline shell and welds (Item Number 3.1.1-05)	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Reactor vessel surveillance (B2.1.20)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.3)
Westinghouse and Babcock & Wilcox (B&W) baffle/former bolts (Item Number 3.1.1-06)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant-specific	Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.3)
Small-bore reactor coolant system and connected systems piping (Item Number 3.1.1-07)	Crack initiation and growth due to SCC, IGSCC, and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.4)
Vessel shell (Item Number 3.1.1-10)	Crack growth due to cyclic loading	TLAA		Not applicable (See Section 3.1.2.2.5)
Reactor internals (Item Number 3.1.1-11)	Changes in dimension due to void swelling	Plant-specific	Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.6)
PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains (Item Number 3.1.1-12)	Crack initiation and growth due to SCC and/or PWSCC	Plant-specific	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18); Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)
Cast austenitic stainless steel (CASS) reactor coolant system piping (Item Number 3.1.1-13)	Crack initiation and growth due to SCC	Plant-specific	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni alloys (Item Number 3.1.1-14)	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.7)
Westinghouse and B&W baffle former bolts (Item Number 3.1.1-15)	Crack initiation and growth due to SCC and irradiation-assisted stress corrosion cracking (IASCC)	Plant-specific	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.8)
Westinghouse and B&W baffle former bolts (Item Number 3.1.1-16)	Loss of preload due to stress relaxation	Plant-specific	Inservice Inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.9)
Steam generator feedwater impingement plate and support (Item Number 3.1.1-17)	Loss of section thickness due to erosion	Plant-specific		Not applicable (See Section 3.1.2.2.10)
(Alloy 600) Steam generator tubes, repair sleeves, and plugs (Item Number 3.1.1-18)	Crack initiation and growth due to PWSCC, ODSCC, and/or IGA or loss of material due to wastage and pitting corrosion, and fretting and wear; or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry	Chemistry control for primary systems program (B2.1.5); Chemistry control for secondary systems program (B2.1.6); Steam generator structural integrity (B2.1.22)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.11)
Tube support lattice bars made of carbon steel (Item Number 3.1.1-19)	Loss of section thickness due to flow-accelerated corrosion	Plant-specific		Not applicable (See Section 3.1.2.2.12)
Carbon steel tube support plate (Item Number 3.1.1-20)	Ligament cracking due to corrosion	Plant-specific		Not applicable (See Section 3.1.2.2.13)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Steam generator feedwater inlet ring and supports (Item Number 3.1.1-21)	Loss of material due to flow accelerated corrosion	Combustion Engineering steam generator feedwater ring inspection	Flow accelerated corrosion (B2.1.11) (for feedwater inlet ring)	Consistent with GALL, which recommends further evaluation (See Section 3.1.2.2.14) Although the Unit 3 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the flow accelerated corrosion program.
Reactor vessel closure studs and stud assembly (Item Number 3.1.1-22)	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
CASS pump casing and valve body (Item Number 3.1.1-23)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1B.2.1.1)
CASS piping (Item Number 3.1.1-24)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1.1)
BWR piping and fittings; steam generator components (Item Number 3.1.1-25)	Wall thinning due to flow- accelerated corrosion	Flow- accelerated corrosion	Flow- accelerated corrosion (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
RCPB valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems (Item Number 3.1.1-26)	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting integrity	Consistent with GALL, (See Section 3.1.2.1.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
CRD nozzle (Item Number 3.1.1-35)	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting) (Item Number 3.1.1-36)	Crack initiation and growth due to cyclic loading, and/or SCC, and PWSCC	Inservice inspection; water chemistry	Chemistry control for primary systems program (B2.1.5); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor vessel internals CASS components (Item Number 3.1.1-37)	Loss of fracture toughness due thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement	Inservice inspection program: reactor vessel internals (B2.1.17)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
External surfaces of carbon steel components in reactor coolant system pressure boundary (Item Number 3.1.1-38)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Steam generator secondary manways and handholds (carbon steel) (Item Number 3.1.1-39)	Loss of material due to erosion	Inservice inspection		Not applicable (See Section 3.1.2.3.4) The steam generators are recirculating-type steam generators.
Reactor internals, reactor vessel closure studs, and core support pads (Item Number 3.1.1-40)	Loss of material due to wear	Inservice inspection	Inservice inspection program: reactor vessel internals (B2.1.17); Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Pressurizer integral support (Item Number 3.1.1-41)	Crack initiation and growth due to cyclic loading	Inservice inspection	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Upper and lower internals assembly (Westinghouse) (Item Number 3.1.1-42)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring	Inservice inspection program: reactor vessel internals (B2.1.17)	Not consistent with GALL (See Section 3.0.3.2.12)
Reactor Vessel internals in fuel zone region (except Westinghouse B&W baffle former bolts) (Item Number 3.1.1-43)	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	PWR vessel internals; water chemistry	Inservice inspection program: reactor vessel internals (B2.1.17); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL (See Section 3.1.2.1.3)
Steam generator upper and lower heads, tubesheets, and primary nozzles and safe ends (Item Number 3.1.1-44)	Crack initiation and growth due to SCC, PWSCC, and/or IASCC	Inservice inspection; water chemistry	Inservice inspection program: systems, components and supports (B2.1.18); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Vessel internals (except Westinghouse and B&W baffle former bolts) (Item Number 3.1.1-45)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry	Inservice inspection program: reactor vessel internals (B2.1.17); Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.1.2.1)
Reactor internals (B&W screws and bolts) (Item Number 3.1.1-46)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	Not applicable	Not applicable (reactor vessel internals were not designed by B&W)
Reactor vessel closure studs and stud assembly (Item Number 3.1.1-47)	Loss of material due to wear	Reactor head closure studs		Not consistent with GALL (See Section 3.1.2.3)
Reactor internals (Westinghouse upper and lower internal assemblies, CE bolts and tie rods) (Item Number 3.1.1-48)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	Inservice inspection program: reactor vessel internals (B2.1.17)	Not consistent with GALL (See Section 3.0.3.2.12)

The staff’s review of the MPS reactor vessel, internals, and reactor coolant system and associated components followed one of several approaches. One approach, documented in Section 3.1B.2.1, involves the staff’s review of the AMR results for components in reactor vessel, internals, and reactor coolant system that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.1B.2.2, involves the staff’s review of the AMR results for components in the reactor vessel, internals, and reactor coolant system that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.1B.2.3, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the reactor coolant system components is documented in Section 3.0.3 of this SER.

3.1B.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

In Section 3.1.2.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the reactor vessel, internals, reactor coolant system, and steam generator components:

- boric acid corrosion program
- chemistry control for primary systems program
- chemistry control for secondary systems program
- inservice inspection program: reactor vessel internals program
- inservice inspection program: systems, components and supports program
- reactor vessel surveillance program
- closed-cycle cooling water system program
- general condition monitoring program
- work control process program
- flow-accelerated corrosion program
- steam generator structural integrity program

<u>Staff Evaluation</u>. In Tables 3.1.2-1 through 3.1.2-4 of the LRA, the applicant provided a summary of AMRs for the reactor vessel, internals, reactor coolant system, and steam generator, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff's evaluation is discussed below.

3.1B.2.1.1 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

In the discussion section of Table 3.1.1, Item 3.1.1-24 of the LRA, the applicant stated that loss of fracture toughness is not an aging effect requiring management for applicable CASS piping and components. During the audit and review, the staff asked the applicant for clarification as to why loss of fracture toughness is not an aging effect requiring management. The applicant replied that loss of fracture toughness of the CASS piping is not an aging effect requiring management because the results of leak-before-break (LBB) analysis demonstrated that there was a large margin between detectable flaw size and flaw instability. The staff reviewed the applicant's TLAA report regarding LBB, and found that the LBB analysis is not a flaw tolerance evaluation as specified by the GALL Report. The applicant agreed that the LBB analysis cannot be used to manage the loss of fracture toughness due to thermal aging embrittlement. The applicant submitted an LRA supplement letter, dated July 7, 2004, and stated as follows:

Note “6” for Tables 3.1.2-1 through 3.1.2-4 (page 3-106), should state the following:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.
>
> 'Loss of Fracture Toughness' as an aging effect for component group 'Pipe (Hot and Cold Leg Piping and Fittings)' should be added in Unit 3 Table 3.1.2-3 (page 3-80). The 'Loss of Fracture Toughness' is managed by the inservice inspection program: systems, components and supports and corresponds to NUREG-1801 Item IV.C2.1-f. The Note for this entry is “A,6” and the 'Table 1 Item' is “3.1.1-24.” NOTE: Only the 'Loss of Fracture Toughness' entry will have Note “6” listed for the above component group.

The “Discussion” column in Table 3.1.1, Item 24, (page 3-32), should read as follows:

> Consistent with NUREG-1801. Loss of fracture toughness is managed with the inservice inspection program: systems, components and supports and this program takes some exception to the NUREG-1801 AMP.

Additionally, a new commitment, Item 28, should be added to LRA Appendix A, Table A6.0-1 as follows and will be implemented prior to the period of extended operation:

> For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.

The applicant modified the corresponding LRA to reflect the audit findings. The staff reviewed the applicant’s LRA supplement and finds that the applicant appropriately addressed the aging mechanism with the abovementioned new commitment, as recommended in the GALL Report.

3.1B.2.1.2 Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In LRA Table 3.1.1, Item 26 (page 3-32), the applicant stated that cracking and loss of preload are managed using AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.” Also, the applicant stated that loss of material due to wear is not an aging effect requiring management for this bolting.

The staff noted that SRP-LR Table 3.1-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting in high pressure or high temperature system for loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC.

The staff questioned the applicant on whether the resolution of all the generic safety issues for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted an LRA supplement. In its supplement, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the “Discussion” column of LRA Table 3.1.1, Item 26 with “consistent with the NUREG-1801.” The staff finds this acceptable since it is consistent with the GALL Report.

3.1B.2.1.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement, and Void Swelling

In LRA Table 3.1.1, Item 43 (page 3-37), the applicant stated that loss of fracture toughness is managed using MPS AMP B2.1.17, “Inservice Inspection Program: Reactor Vessel Internals.” Also, the applicant stated that MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” is not credited to manage these aging effects, but is applied to all reactor vessel internals components as a corrosion mitigation program.

The staff reviewed the inservice inspection program: reactor vessel internals program and the chemistry control for primary systems program and its evaluation is documented in Sections 3.0.3.2.12 and 3.0.3.2.1 of this SER, respectively. On the basis of its review, the staff agreed with the applicant that the chemistry control for primary systems program is a corrosion mitigation program. The staff finds that the applicant’s proposed program is adequate to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling.

On the basis of its audit and review, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its audit and review, the staff determined that for all other AMRs not requiring further evaluation, as identified in LRA Table 3.1.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further staff review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.1.2.2 of the LRA, the applicant provided further evaluation of aging management as recommended by the GALL

Report for reactor vessel, internals, reactor coolant system, and steam generator components. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to pitting and crevice corrosion
- loss of fracture toughness due to neutron irradiation embrittlement
- crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking
- crack growth due to cyclic loading
- changes in dimension due to void swelling
- crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking
- crack initiation and growth due to stress corrosion cracking or irradiation-assisted stress corrosion cracking
- loss of preload due to stress relaxation
- loss of section thickness due to erosion
- crack initiation and growth due to PWSCC, ODSCC, or integranular attack or loss of material due to wastage and pitting corrosion or loss of section thickness due to fretting and wear or denting due to corrosion of carbon steel tube support plate
- loss of section thickness due to flow-accelerated corrosion
- ligament cracking due to corrosion
- loss of material due to flow-accelerated corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in Section 3.1.3.2 of the SRP-LR. Details of the staff's audit and review are documented in the staff's audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections of this SER.

3.1B.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.1B.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion

In LRA Section 3.1.2.2.2.1, the applicant addressed loss of material of steam generator assemblies due to pitting and crevice corrosion.

SRP-LR Section 3.1.2.2.2 states that loss of material due to pitting and crevice corrosion could occur in the steam generator shell assembly. The existing program relies on control of water chemistry to mitigate corrosion, and inservice inspection to detect loss of material. NRC IN 90-04, “Cracking of the Upper Shell-to-Transition Cone Girth Welds in Steam Generators,” states that if general corrosion pitting of the shell exists, the existing program may not be sufficient. In that case, the GALL Report recommends augmented inspections to manage the aging effect.

The AMPs recommended by the GALL Report for managing the aging of steam generator assemblies due to pitting and crevice corrosion are GALL AMP XI.M1, “ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD,” to detect loss of material and GALL AMP XI.M2, “Water Chemistry,” to mitigate corrosion. The GALL Report recommends a plant-specific program to conduct augmented inspections.

In the LRA, the applicant credited MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B2.1.6, “Chemistry Control for Primary Systems,” for managing loss of material due to pitting and crevice corrosion for the internal surfaces of the steam generator shell. The staff evaluated these programs and its evaluation is documented in Section 3.0.3.2.13 and Section 3.0.3.32 of this SER, respectively.

The staff reviewed NRC IN 90-04, which identifies the need to perform augmented inspections beyond the requirements of ASME Section XI, if general corrosion pitting of the steam generator shell is known to exist, in order to differentiate isolated cracks from inherent geometric conditions. The staff reviewed operating experience which indicated that no pitting corrosion of the steam generator shell has been detected to date, and that water chemistry has been maintained for these steam generators per EPRI guidelines. The staff finds that the augmented inspections recommended by NRC IN 90-04 and referenced in the SRP-LR do not currently apply to the Unit 3 steam generators.

Also, since pitting corrosion has not been detected on the steam generator shell since installation, the staff finds that augmented inspections are not required and that the current water chemistry control and inservice inspection programs are consistent with the recommendations of the GALL Report and adequately manage this aging effect.

The staff finds that, based on the programs identified above, the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

In LRA Section 3.1.2.2.3, the applicant addressed (1) loss of fracture toughness due to neutron irradiation embrittlement for ferritic materials that have a neutron fluence of greater than 10^{17} n/cm^2 at the end of the license renewal term, (2) loss of fracture toughness due to irradiation embrittlement of the reactor vessel beltline materials, and (3) loss of fracture toughness due to irradiation embrittlement and void swelling of the Westinghouse baffle/former bolts.

SRP-LR Section 3.1.2.2.3 states that certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3 and that TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). SRP-LR Section 3.1.2.2.3 also states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR 50, Appendix H, an applicant is required to submit its proposed capsule withdrawal schedule for approval prior to implementation. SRP-LR Section 3.1.2.2.3 states that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in Westinghouse baffle/former bolts.

The AMP recommended by the GALL Report for managing loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel is GALL AMP XI.M31, “Reactor Vessel Surveillance,” which complies with the requirements of 10 CFR 50, Appendices G and H, and 10 CFR 50.61.

Certain aspects of neutron irradiation embrittlement are a TLAA as defined in 10 CFR 54.3. The TLAA is required to be evaluated in accordance with a 10 CFR 54.21(c)(1). The staff’s evaluation of this TLAA can be found in Section 4.2 of this SER, following the guidance in Section 4.2 of the Standard Review Plan for License Renewal (SRP-LR).

Loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant-specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal. NUREG-1801 recommends further evaluation of the reactor vessel materials surveillance program for the period of extended operation. The staff verifies that the applicant has proposed an adequate reactor vessel materials surveillance program for the period of extended operation. This staff evaluation is discussed in Section 3.0.3.1.3 of this SER.

The limiting beltline material for upper shelf energy (USE) at Millstone Unit 2 is the intermediate and lower shell beltline axial welds, heat no. A8746. The limiting beltline material for pressurized thermal shock (PTS) at Millstone Unit 2 is the Lower Shell Plate C-506-1 (Heat No. C5667-1). The Millstone Unit 2 reactor vessel surveillance program, in conjunction with TLAA analyses, effectively manages loss of fracture toughness in the beltline materials. The reactor vessel surveillance program provides adequate material property and neutron dosimetry data to predict fracture toughness in beltline materials at the end of the period of extended operation. The analyses (see TLAAs, SER Section 4.2) for the USE and PTS provide assurance that beltline material toughness values in the Millstone Unit 2 reactor vessel will remain at acceptable levels through the period of extended operation. The reactor vessel surveillance program is reviewed in SER Section 3.0.3.1.3 (AMP B2.1.20).

Loss of fracture toughness due to neutron irradiation embrittlement and void swelling could also occur in control element assembly (CEA) shroud bolts, core shroud tie rods, and core support barrel snubber assemblies. The staff reviewed the applicant's proposed program on a case-by-case basis to ensure that an adequate program will be in place for management of these aging effects. A combination of the ASME Section XI, Subsections IWB, IWC, and IWD inservice inspection program and the reactor vessel internals program (described in Appendix B) will be used to manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling in CEA shroud bolts, core shroud tie rods and core support barrel snubber assemblies. Millstone will also participate in industry activities and monitor industry initiatives for the purpose of evaluating the significance of void swelling and fracture toughness on selected PWR reactor vessel internals components. As new information and technology becomes available, the plant-specific reactor vessel internals program will be modified to incorporate enhanced surveillance techniques. In addition, the applicant has identified the implementation of the industry initiatives as commitment 13 in Appendix A, Table A6.0-1 of the LRA. The evaluation of this program and the commitment to updating this program is addressed in Section 3.0.3.2.12 (AMP B2.1.17) of this SER.

The staff finds that the applicant's AMR results are consistent with the GALL Report and that the applicant has demonstrated that the programs to manage the effects of aging will be adequate to maintain the intended functions consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking

In LRA Section 3.1.2.2.4.1, the applicant addressed the potential crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking) that could occur in small-bore RCS and connected system piping less than 4-inch nominal pipe size (NPS 4).

SRP-LR Section 3.1.2.2.4.1 states that the GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the period of extended operation. The applicant should verify that service-induced weld cracking is not occurring in small-bore piping less than NPS 4. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect is not occurring and the component's intended function will be maintained during the period of extended operation. Per ASME Section XI, 1995 edition, examination category B-J or B-F, small bore piping, defined as piping less than NPS 4, does not receive volumetric inspection.

The GALL Report recommended GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" to detect loss of material and GALL AMP XI.M2, "Water Chemistry" to mitigate SCC.

The staff reviewed LRA Section 3.1.2.2.4.1. The applicant credited MPS AMP B2.1.18, "Inservice Inspection Program: Systems, Components and Supports," and MPS AMP B2.1.5, "Chemistry Control for Primary Systems," to mitigate cracking of reactor coolant piping. The staff evaluated these programs and its evaluation is documented in Sections 3.0.3.2.13 and 3.0.3.2.2 of this SER, respectively.

To address the GALL Report recommendation that a plant-specific destructive examination or an NDE that permits inspection of the inside surfaces of the piping be conducted, the applicant stated in the LRA that it has implemented an RI-ISI methodology to select RCS piping welds for inspection in lieu of the requirements specified in ASME Section XI. To address the GALL Report for a one-time inspection of small-bore piping less than NPS 4, the application indicated that small-bore pipe butt-welded connections are included in the final weld selection for performance of volumetric examination. The staff verified that the applicant used the RI-ISI process to determine the most susceptible locations for performing the volumetric examination and did not eliminate small-bore pipe welds from examination with the RI-ISI process.

The staff reviewed and verified that the applicant’s RI-ISI plan will perform a volumetric examination, which is required to address cracking for small-bore Class 1 piping per ISG-12, “One-Time Inspection of Small-Bore Piping,” on elements not currently required to be volumetrically examined. Based on the programs identified above, the staff finds that the applicant appropriately evaluated AMR results involving current inspection methods, as detailed in the inservice inspection program, and as supplemented by water chemistry control, for managing cracking of small-bore piping systems.

The staff finds that the applicant's AMR results are consistent with the GALL Report, and that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.5 Crack Growth Due to Cyclic Loading

NUREG-1801 recommends further evaluation of programs to manage crack growth due to cyclic loading in the reactor vessel shell. Crack growth due to cyclic loading in reactor vessel shells are evaluated as a TLAA. Growth of intergranular separations (underclad cracks) in low-alloy or carbon steel heat-affected zones under austenitic stainless steel cladding is a TLAA to be evaluated for the period of extended operation for all the SA 508-Class 2 forgings where the cladding was deposited with a high heat input welding process. Since Millstone Unit 3 does not use SA 508-Class 2 forgings in the beltline region, this evaluation is not applicable. In addition, the Millstone Unit 3 LRA, Section 3.1.2.2.5 states that there are no detected underclad cracks identified in the reactor vessel.

3.1B.2.2.6 Changes in Dimension Due to Void Swelling

In LRA Section 3.1.2.2.6, the applicant addressed changes in dimension due to void swelling that could occur in reactor internal components.

SRP-LR Section 3.1.2.2.6 states that the GALL Report recommends that changes in dimension due to void swelling in reactor internal components be evaluated to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated to manage the effects of changes in dimension due to void swelling and the loss of fracture toughness associated with swelling.

In general, the applicant has concluded that void swelling is an aging related effect for the reactor vessel internals, but currently only credits the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspections to manage change in dimensions due to void swelling. In lieu of the implementation of augmented inspections, such as enhanced visual VT-1 examinations or enhanced volumetric examination, Millstone will follow industry efforts to determine the necessary steps for managing void swelling. Currently no augmented inspection will be performed. However, since the EPRI Materials Research Project - Reactor Internals Issue Task Group is currently addressing this issue, the applicant will follow the industry effort related to void swelling and will implement the appropriate recommendations resulting from this guidance. In addition, the applicant has identified the implementation of the industry initiatives as commitment 13 in Appendix A, Table A6.0-1 of the LRA. Further evaluation of this program and the commitment to updating this program is addressed in Section 3.0.3.2.12 (AMP B2.1.17) of this SER.

The staff finds the applicant’s approach for managing changes in dimension due to void swelling acceptable because the approach will be based on the guidelines developed by the ongoing industry activities related to void swelling. The applicant has committed to implement the appropriate recommendations resulting from the industry efforts. The applicant also committed, through an LRA supplement letter dated July 7, that the revised program description, including a comparison to the 10 program elements of the GALL Report program, will be submitted to the NRC for approval prior to the period of extended operation.

On the basis of its review, the staff finds the applicant's approach for managing changes in dimension due to void swelling will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.7 Crack Initiation and Growth Due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking

In the LRA Section 3.1.2.2.7.1, the applicant addressed (1) crack initiation and growth due to SCC and PWSCC in the pressurizer (spray head assembly/nozzle assembly), core support pads, and instrumentation tubes (bottom head); (2) crack initiation and growth due to SCC in the hot leg and cold leg piping and fittings fabricated of CASS; and (3) crack initiation and growth due to PWSCC in nickel-based alloy material such as the pressurizer (safe-end welds, surge, spray, relief, and safety), reactor vessel (safe-end welds, primary inlet and outlet), and steam generator primary drain nozzle weld.

SRP-LR Section 3.1.2.2.7 states that:

- Crack initiation and growth due to SCC and PWSCC could occur in core support pads (or core guide lugs), instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC.

- Crack initiation and growth due to SCC could occur in CASS RCS piping and fittings and pressurizer surge line nozzles. The GALL Report recommends further evaluation of piping that does not meet either the reactor water chemistry guidelines of EPRI TR-105714 or material guidelines of NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping,” Revision 2, January 1988.

- Crack initiation and growth due to PWSCC could occur in pressurizer instrumentation penetrations and heater sheaths and sleeves made of nickel alloys. The existing program relies on ASME Section XI inservice inspections and on control of water chemistry to mitigate PWSCC. However, the existing program should be augmented to manage the effects of SCC on the intended function of nickel-alloy components. The GALL Report recommends that the applicant provide a plant-specific AMP or participate in industry programs to determine appropriate AMPs for PWSCC of the Inconel 182 weld.

The applicant credited the following plant-specific programs for each of the three SRP-LR criteria:

- Cracking of nickel-based alloy components due to PWSCC is managed by the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” supplemented by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” Additionally, EPRI, through its MRP and in conjunction with the PWR owners groups, is developing a strategic plan to manage and mitigate cracking of nickel-based alloy items. The applicant stated that the guidance developed by the MRP will be used to identify the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance as described in license renewal Commitment, Item 15. Pressurizer spray head fabricated from stainless steel is not a reactor coolant pressure boundary component and is managed by MPS AMP B2.1.5, ”Chemistry Control for Primary Systems Program.”
- Crack initiation and growth due to SCC at weld connections, including the hot leg and cold leg piping and fittings, is managed by MPS AMP B2.1.5,” Chemistry Control for Primary Systems Program,” and MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports.”
- The programs credited for the management of PWSCC of these nickel-based alloy items are the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management activities, which are part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” As described in Item 1 above, the applicant committed to participate in the nickel-based alloys industry programs to identify appropriate aging management activities and implement the appropriate recommendations from the guidance developed by industry programs.

The GALL Report recommends that a plant-specific aging management program be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of the SRP-LR). The staff reviewed the applicant’s proposed program to ensure that an adequate program will be in place for the management of these aging effects.

Crack initiation and growth due to SCC could occur in PWR CASS reactor coolant system piping and fittings and the pressurizer surge line nozzle. For PWR’s, NUREG-1801 recommends further evaluation of piping that does not meet the reactor water chemistry guidelines of TR-105714, “PWR Primary Water Chemistry Guidelines, Revision 3,” November 1995, or later. Since Millstone Unit 3 uses the guidelines of Revision 4 to TR-105714, no further evaluation of a plant-specific AMP is required since the applicant minimizes the potential for SCC by using the later revision of TR-105714 in accordance with NUREG-1801. In addition the applicant uses the inservice inspection program: systems, components and supports to manage cracking of CASS components. The applicant's AMP B2.1.18 includes the AMP recommendations for CASS in NUREG-1801, AMP XI.M12, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS), and AMP XI.M1, ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD.

Crack initiation and growth due to PWSCC could occur in reactor vessel bottom head instrumentation penetrations, pressurizer instrumentation penetrations and heater sheaths and sleeves, and the pressurizer safe-ends for surge line, spray, relief and safety system lines made of nickel-based alloys. The pressurizer heater sheaths and sleeves in Millstone Unit 3 are made of stainless steel and therefore are not subject to PWSCC. The existing program relies on ASME Section XI Inservice Inspection (ISI) and on control of water chemistry to mitigate PWSCC. However, the existing program should be augmented to manage the effects of PWSCC on the intended function of components fabricated from nickel-based alloys. NUREG-1801 recommends that the applicant provide a plant-specific AMP or participate in industry programs to determine an appropriate AMP for PWSCC of Inconel 182 weld. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1 of the SRP-LR). The staff reviewed the applicant's proposed program to ensure that an adequate program will be in place for the management of these aging effects. Millstone Unit 3 has nickel-based alloys (Alloy 600 and 82/182) in the reactor vessel bottom head instrumentation penetrations and the welds joining the pressurizer safe-ends to the surge, spray, relief and safety system lines. The Millstone Unit 3 LRA (Appendix A, Table A6.0-1, commitment 15) identifies that Millstone Unit 3 will participate in industry programs to determine appropriate measures to manage PWSCC and submit an appropriate AMP to the NRC staff for approval prior to entering the extended period of operation. The aging management program for PWSCC is discussed in AMP B2.1.18. Additional assurance of crack detection is through the boric acid corrosion program, which is described in AMP B2.1.3. In this program, leakage detection is utilized to detect cracks in Alloy 600 base metal and Alloy 82/182 weld metal components in the pressurizer, as specified in NRC Bulletin 2004-01.

The CASS pressurizer spray head assembly identified in Table 3.1.2-3 of the LRA specified the chemistry control AMP to manage cracking. NUREG-1801, Section IVC2.5-j identifies a plant-specific AMP to be used to manage cracking. Therefore, the applicant was requested in RAI 3.1.3-2 to provide this AMP to the NRC for evaluation as recommended by NUREG-1801, Section IVC2.5-j.

In response to RAI 3.1.3-2, in a letter dated December 3, 2004, the applicant stated that the plant-specific AMP specified in Millstone Unit 3 LRA, Table 3.1.2-3 for managing the aging effects associated with the CASS pressurizer spray head is the chemistry control for primary systems program. The RCS stainless steel materials, including the pressurizer spray head, are exposed internally to a high-quality primary water and/or steam environment that is not expected to result in significant stress corrosion cracking. Therefore, the applicant stated that the chemistry control for primary systems program AMP provides reasonable assurance that cracking resulting from SCC will not prevent the spray head from performing its intended function. The staff agrees that the water chemistry can be used to mitigate SCC, but an inspection is necessary to indicate whether the water chemistry has prevented SCC. Discussed in Section 3.1A.3. The aging management program for SCC, including the spray head is discussed in AMP B2.1.18 in SER Section 3.0.3.2.13.

The applicant stated in Section 4.3.1 of the Millstone Unit 3 LRA that the CASS pressurizer spray head assembly has been evaluated for susceptibility to thermal embrittlement using the guidance and information contained in EPRI Report TR-106092. In addition the applicant stated that acceptable results employing applicable loads (e.g., thermal cycles) and material properties have been calculated over the 60-year license renewal period. The staff notes that GALL AMP XI.M12 recommends the CASS material to be evaluated based on the criteria set forth in the May 19, 2000, NRC letter to determine susceptibility to thermal aging embrittlement. This letter provided the staff's position on thermal aging embrittlement. The staff requests that the applicant confirm that the evaluation performed meets the guidelines of the May 19, 2000, NRC letter and NUREG-1801. If the evaluation does not conform to these guidelines, the applicant is requested to provide the results of an evaluation that meets the guidelines of the May 19, 2000, NRC letter and the information (i.e., molybdenum content, casting method and percent ferrite) to confirm that the spray head satisfies the criteria set forth in the staff's letter dated May 19, 2000. The applicant is also requested to discuss how this evaluation meets the requirements of 10 CFR 54.21(c)(1)(i), (ii) or (iii).

In response to supplemental RAI 3.1.3-3, in a letter dated February 8, 2005, the applicant stated that the response to supplemental RAI 4.7.3-1(a) addresses supplemental RAI 3.1.3-3. The staff noted that the response to RAI 4.7.3-1(a) provides information on the evaluation of CASS reactor coolant pumps and not the CASS spray head assembly requested in supplemental RAI 3.1.3-3. Therefore, the applicant was requested to provide the information requested by supplemental RAI 3.1.3-3. This was identified as Confirmatory Item 3.1.3-3.

In a supplemental response to RAI 3.1.3-3, dated June 2, 2005, the applicant agreed that the guidance contained in the staff's letter to NEI, dated May 19, 2000, should be used when analyzing the pressurizer spray head through the extended period of operation. The applicant therefore initiated an evaluation of the Millstone, Unit 3 pressurizer spray head to determine the crack growth over the period of extended operation in accordance with NUREG-1801, Section XI.M12 "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)," Item 6 (Acceptance Criteria) and the flaw evaluation section of the staff's letter to NEI, dated May 19, 2000. As stated in NUREG-1801, Section XI.M12, the flaw tolerance evaluation for CASS components with ferrite values up to 25 percent is performed according to the methodology associated with the ASME Code Subsection IWB-3640 procedure for submerged arc welds. The applicant, however, could not positively confirm that the ferrite content of the Millstone, Unit 3 pressurizer spray head was less than 25 percent based on the currently available data. Since the ferrite content could not be confirmed to be less than the 25 percent used in the ASME Code methodology, the applicant could not utilize the flaw tolerance evaluation to resolve this issue and decided to manage thermal aging embrittlement of the Millstone, Unit 3 pressurizer spray head by enhanced volumetric inspections performed under the aging management program, "Inservice Inspection Program: Systems, Components and Supports," in accordance with 10 CFR 54.21(a)(1)(iii). The applicant also stated that this program is consistent with NUREG-1801, Section XI.M12, which considers an enhanced volumetric inspection (ultrasonic examination) that meets the criteria of the ASME Code, Section XI, Appendix VIII, "Performance Demonstrations for Ultrasonic Examination Systems," acceptable. This commitment is contained in the Millstone, Unit 3 LRA, Appendix A, Section A6.0, Table A6.0-1 "License Renewal Commitments," Item 28, and states that either an enhanced volumetric examination or a component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801, Section XI.M12. The staff finds the applicant's management of thermal aging embrittlement through inspection in accordance with 10 CFR 54.21(c)(1)(iii) acceptable. The staff also finds that if the applicant can confirm the ferrite content in the future, a flaw tolerance evaluation in accordance with the guidelines of NUREG-1801, Section XI.M12 is an acceptable alternative to the volumetric examination in accordance with NUREG-1801. This evaluation would have to be submitted to the NRC for approval at least two years prior to the period of extended operation. This resolves Confirmatory Item 3.1.3-3.

The staff reviewed the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program for these aging effects and its evaluations are in Section 3.0.3.2.2 and Section 3.0.3.2.13 of this SER, respectively.

The nickel-based alloy aging management activity is part of AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” and the staff’s evaluation of the nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) aging management is documented in Section 3.0.3.2.13 of this SER.

On the basis of its review, the staff finds that the applicant has adequately evaluated the management of crack initiation and growth due to stress corrosion cracking or primary water stress corrosion cracking for components in the reactor systems, as recommended in NUREG-1801. On the basis of this finding, and the finding that the remainder of the applicant’s program is consistent with NUREG-1801, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.8 Crack Initiation and Growth Due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking

Crack initiation and growth due to SCC or IASCC could occur in baffle/former bolts in Westinghouse reactors. A combination of the water chemistry control program and the reactor vessel internals program will be used to manage this aging effect. In addition, Millstone Unit 3 will participate in Westinghouse Owners Group (WOG) activities and monitor industry initiatives for the purpose of evaluating the significance of cracking due to IASCC on selected PWR reactor vessel internals components. As new information and technology becomes available, the plant-specific reactor vessel internals program (described in Appendix B) will be modified to incorporate enhanced surveillance techniques.

The applicant has identified the implementation of the industry initiatives as commitment 13 in Appendix A, Table A6.0-1 of the LRA. Further evaluation of this program and the commitment to updating this program is addressed in Sections 3.0.3.2.12 (AMP B2.1.17) of this SER.

On the basis of its review, the staff finds that the applicant has adequately evaluated the management of crack initiation and growth due to stress corrosion cracking or irradiation-assisted stress corrosion cracking for components in the reactor systems, as recommended in NUREG-1801. On the basis of this finding, and the finding that the remainder of the applicant’s program is consistent with NUREG-1801, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.9 Loss of Preload Due to Stress Relaxation

Loss of preload due to stress relaxation could occur in baffle/former bolts in Westinghouse reactors. Loss of preload due to stress relaxation will be managed by the reactor vessel internals program. In addition, Millstone Unit 3 will continue to participate in industry investigations of aging effects applicable to reactor vessel internals as well as initiatives to develop advanced inspection techniques which will permit resolution and measurement of very small features of interest. Aging management activities or surveillance techniques resulting from these initiatives will be incorporated, as required, as enhancements to the reactor vessel internals program. The applicant has identified the implementation of the industry initiatives as commitment 13 in Appendix A, Table A6.0-1 of the LRA. Further evaluation of this program and the commitment to updating this program is addressed in Section 3.0.3.2.12 (AMP B2.1.17) of this SER.

On the basis of its review, the staff finds that the applicant has adequately evaluated the management of the loss of preload due to stress relaxation for components in the reactor systems, as recommended in NUREG-1801. On the basis of this finding, and the finding that the remainder of the applicant’s program is consistent with NUREG-1801, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.2.10 Loss of Section Thickness Due to Erosion

In LRA Section 3.1.2.2.10, the applicant stated that the steam generators do not have feedwater impingement plates and that the discussion in this paragraph of the SRP-LR is not applicable.

SRP-LR Section 3.1.2.2.10 states that loss of section thickness due to erosion could occur in steam generator feedwater impingement plates and supports. The GALL Report recommends further evaluation of a plant-specific AMP to ensure that this aging effect is adequately managed.

On the basis that feedwater impingement plates are not part of the steam generator design, the staff finds that this aging effect is not applicable.

3.1B.2.2.11 Crack Initiation and Growth Due to Primary Water Stress Corrosion Cracking, Outside Diameter Stress Corrosion Cracking, or Intergranular Attack or Loss of Material Due to Wastage and Pitting Corrosion or Loss of Section Thickness Due to Fretting and Wear or Denting Due to Corrosion of Carbon Steel Tube Support Plate

In LRA Section 3.1.2.2.11, the applicant addressed crack initiation and growth due to PWSCC, SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation due to corrosion that could occur in nickel-based alloy components of the steam generator tubes and tube plugs.

SRP-LR Section 3.1.2.2.11 states that crack initiation and growth due to PWSCC, outside diameter SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation due to corrosion could occur in Alloy 600 components of the steam generator tubes, repair sleeves, and plugs. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other regulatory bases for steam generator degradation management, should be developed to ensure that this aging effect is adequately managed.

The SRP-LR also states that crack initiation and growth due to PWSCC, SCC, or IGA, or loss of material due to wastage and pitting corrosion, or deformation due to corrosion could occur in nickel-based alloy components of the steam generator tubes and plugs.

To manage the effects of aging, the applicant credited AMP B2.1.23, “Steam Generator Structural Integrity,” supplemented by AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and AMP B2.1.6, “Chemistry Control for Secondary Systems Program.” The staff’s evaluation of the steam generator structural integrity program is documented in Section 3.0.3.2.16 of this SER. The staff reviewed the chemistry control for primary systems and secondary systems programs, and its evaluations are documented in Sections 3.0.3.2.2 and 3.0.3.2.3 of this report, respectively. For general and pitting corrosion, assessment of tube integrity, and plugging or repair criteria of flawed tubes, the steam generator structural integrity program acceptance criteria are in accordance with NEI 97-06 guidelines.

On the basis of its review of the chemistry control for primary and secondary systems programs, the staff finds that the applicant appropriately evaluated AMR results involving plant-specific programs to address these aging mechanisms, as recommended in the GALL Report.

3.1B.2.2.12 Loss of Section Thickness Due to Flow-Accelerated Corrosion

In LRA Section 3.1.2.2.12, the applicant stated that the steam generator tube support lattice bars are constructed of stainless steel. Therefore, loss of section thickness of these bars is not an applicable aging effect.

SRP-LR Section 3.1.2.2.12 states the loss of section thickness due to FAC could occur in tube support lattice bars made of carbon steel. The GALL Report recommends that a plant-specific AMP be evaluated and, on the basis of the guidelines of NRC GL 97-06, an inspection program for steam generator internals be developed to ensure that this aging effect is adequately managed.

On the basis that carbon steel tube support lattice bars are not part of the steam generator design, the staff finds that this aging effect is not applicable.

3.1B.2.2.13 Ligament Cracking Due to Corrosion

In LRA Section 3.1.2.2.13, the applicant stated that the tube support plates are not used in the steam generators. Therefore, ligament cracking due to corrosion is not an applicable aging effect.

SRP-LR Section 3.1.2.2.13 states that ligament cracking due to corrosion could occur in carbon steel components in the steam generator tube support plate. All PWR licensees have committed voluntarily to a steam generator degradation management program described in NEI 97-06; these guidelines are currently under NRC staff review. The GALL Report recommends that an AMP based on the recommendations of staff-approved NEI 97-06 guidelines, or other regulatory bases for steam generator degradation management, be developed to ensure that this aging effect is adequately managed.

On the basis that tube support plates are not used in the steam generators, the staff finds that this aging effect is not applicable.

3.1B.2.2.14 Loss of Material Due to Flow-Accelerated Corrosion

In LRA Section 3.1.2.2.14, the applicant addressed loss of material due to FAC.

SRP-LR Section 3.1.2.2.14 states that loss of material due to FAC could occur in the feedwater inlet ring and supports. As noted in Combustion Engineering (CE) IN 90-04, NRC IN 91-19 and LER 50-362/90-05-01, this form of degradation has been detected only in certain CE System 80 SGs. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed. The GALL Report recommends that a plant-specific AMP be evaluated because existing programs may not be capable of mitigating or detecting loss of material due to FAC.

The staff noted that, in LRA Table 3.1.2-4 (page 3-95), for loss of material of feedwater inlet ring and support component type of carbon steel exposed internally to a treated water environment, the applicant credited the chemistry control for secondary systems program. During the audit, the staff asked the applicant to clarify why the FAC program is not assigned to this component.

In its LRA supplement letter dated July 7, 2004, the applicant stated that the FAC program should be added for the feedwater inlet ring and support component type. In addition, the GALL Report item match for this entry should be “IV.D1.3-a” with “Note B.” Also, the “Table 1 Item” entry should be “3.1.1-21.” Furthermore, the applicant stated that in LRA Section 3.1.2.2.14 (page 3-21) and LRA Table 3.1.1, the discussion column for Item 3.1.1-21 (page 3-31) should state:

> Although the Unit 3 steam generators are not CE System 80 steam generators, the feedwater inlet ring is included in the Flow Accelerated Corrosion program.

During the audit, the staff further requested that the applicant clarify how the FAC inspection of the steam generator feedwater ring would be performed. The applicant responded that the FAC inspection of the feedwater inlet is performed using the program generic FAC inspection techniques for gridding and UT.

On the basis of its review, the staff finds that the applicant has demonstrated that the effect of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.2.15 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff’s evaluation of the applicant’s quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determined that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent, and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.1.2-1 through 3.1.2-4 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In LRA Tables 3.1.2-1 through 3.1.2-4, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material, and environment combination that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff's evaluation is discussed below.

3.1B.2.3.1 Reactor Vessel - Aging Management Evaluation - Table 3.1.2-1

In Section 3.1.2.1.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor vessel and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- inservice inspection program: reactor vessel internals
- inservice inspection program: systems, components and supports
- reactor vessel surveillance

In Table 3.1.2-1 of the LRA, the applicant provided a summary of AMRs for the reactor vessel and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed Table 3.1.2-1 of the LRA, which summarizes the results of AMR evaluations for the reactor vessel component groups. The staff has reviewed the information in this table and agrees that the applicant has identified the applicable aging effects because the aging effects are appropriate for these materials and environment and are consistent with industry operating experience, except for the following components, which are discussed below.

NUREG-1801, Section IVA2.8-b states that the pressure vessel skirt support, cantilever/column support, and neutron shield tank are subject to loss of material due to boric acid corrosion. The applicant was requested in RAI 3.1.1-1 to include this aging effect and the necessary AMPs for these components concerning loss of material due to boric acid corrosion in Table 3.1.2-1 of the LRA or provide justification for concluding that boric acid corrosion is not an aging effect.

In response to RAI 3.1.1-1, in a letter dated December 3, 2004, the applicant stated that the structural supports for major reactor coolant system components are evaluated separately from the component and its integral parts, as NSSS equipment supports. There are no skirt support or cantilever/column support components for the Millstone Unit 3 reactor vessel support system. The Millstone Unit 3 reactor pressure vessel supports are included as structural members in LRA Table 3.5.2-35. Therefore, loss of material due to boric acid corrosion is identified for these structural members consistent with NUREG-1801 item III.B1.1.1-b, and is managed with the boric acid corrosion and general condition monitoring aging management programs.
This resolves RAI 3.1.1-1.

Table 3.1.2-1 of the LRA does not specify loss of material/wear for the closure head stud assembly as identified by NUREG-1801, Section IVA.2.1-d. The applicant was requested in RAI 3.1.1-2 to include this aging effect and the corresponding aging management program (AMP XI.M3 of NUREG-1801 “Reactor Head Closure Studs”) in Table 3.1.2-1 of the LRA or provide justification for concluding that loss of material/wear is not an aging effect.

In response to RAI 3.1.1-2, in a letter dated December 3, 2004, the applicant stated that the closure head stud assembly does not experience relative motion other than normal stud removal and installation during refueling activities. These activities are closely monitored by procedures and any degradation is dispositioned by supplemental examination, corrective measures or repairs, analytical evaluation of the component function, or replacement of the component to ensure continued structural integrity and function of the component. There is no significant continuing wear to the reactor vessel closure studs that would lead to a loss of component function and require monitoring by an aging management program. Therefore, the applicant did not consider loss of material due to wear as an applicable aging effect for the closure head stud assembly. However, AMP XI.M3 of NUREG-1801 and RG 1.65 indicates that reactor closure studs are susceptible to loss of material due to wear. In addition, RG 1.65 recommends, and the applicant uses, coatings and lubrication which are used to reduce wear. Therefore, the staff requested that the LRA specify loss of material due to wear as an aging effect for the closure head stud assembly and specify the AMP to be applied.

In its response dated February 8, 2005 to supplemental RAI 3.1.1-2, the applicant stated that although wear of the reactor closure studs is not expected to affect the intended function of the bolting, loss of material due to wear will be considered as an aging effect consistent with NUREG-1801, item IV.A2.1-d. The aging effect will be managed by the inservice inspection program: systems, components and supports AMP. The staff finds this response acceptable since it has identified the applicable aging effect and provides an aging management program which requires inspection of the closure studs in accordance with the ASME Code requirements that are capable of detecting loss of material. This resolves RAI 3.1.1-2.

Table 3.1.2-1 of the LRA does not specify loss of fracture toughness/neutron irradiation embrittlement for the upper shell as identified by NUREG-1801, Section IVA.2.5-c. The applicant was requested in RAI 3.1.1-3 to include this aging effect and the corresponding aging management program (AMP XI.M31 of NUREG-1801 "Reactor Vessel Surveillance") in Table 3.1.2-1 of the LRA or provide justification for concluding that fracture toughness/neutron irradiation embrittlement is not an aging effect.

In response to RAI 3.1.1-3, in a letter dated December 3, 2004, the applicant stated loss of fracture toughness due to neutron irradiation embrittlement is an applicable aging effect for those reactor pressure vessel subcomponents exposed to a neutron fluence greater than $1x10^{17}$ n/cm^2 (E>1MeV). This threshold level of fluence is experienced by the beltline region subcomponents identified in LRA Table 3.1.2-1 as susceptible to loss of fracture toughness. Based on a supplemental evaluation performed by the applicant, the upper shell and primary inlet nozzles and their associated welds are subjected to loss of fracture toughness due to neutron irradiation embrittlement and will be managed with the reactor vessel surveillance AMP. However, the staff notes that the applicant did not provide the USE and PTS evaluations for these reactor pressure vessel subcomponents as required by Appendix G to10 CFR Part 50, and 10 CFR 50.61, respectively. Therefore to confirm that the USE and PTS evaluations for these subcomponents meet regulatory requirements at the end of the period of extended operation, the staff requests the applicant to include the USE and PTS evaluation (similar to the data currently in Tables 1 and 2 of the FSAR for the other reactor vessel subcomponents) for the upper shell and primary nozzles and their associated welds into Tables 1 and 2 of the Millstone Unit 3 FSAR supplement and determine the effect on the limiting materials.
This is issue is discussed in Section 3.1A.2.3.1.

Table 3.1.2-1 of the LRA did not specify loss of material/wear for the vessel flange and core support ledge as identified by NUREG-1801, Section IVA.2.5-f. Therefore, the applicant was requested in RAI 3.1.3-1 to include the aging effect and the corresponding aging management program recommended by NUREG-1801 (AMP XI.M1, "Inservice inspection") in the LRA or provide justification for concluding that loss of material/wear is not an aging effect.

In its response to RAI 3.1.2-1, dated December 3, 2004, the applicant stated that loss of material due to wear was not considered an applicable aging effect for the reactor vessel flange and core support ledge since they do not experience relative motion other than normal reactor disassembly and reassembly during refueling activities. These activities are closely monitored by procedure and any degradation is dispositioned by supplemental examination, corrective measures or repairs, analytical evaluation of the component function, or replacement of the component to ensure continued structural integrity and function of the component. There is no significant continuing wear to the reactor vessel flange and core support ledge that would lead to a loss of component function that would require monitoring by an aging management program. However, the staff considers wear to be an aging effect as identified by NUREG-1801, Section IVA.2.5-f, because the reactor vessel flange and support ledge do experience relative motion during reactor disassembly and reassembly during refueling activities. This aging effect should then be monitored. Since the applicant stated this refueling activity is monitored by procedures, some type of inspection must be performed to monitor wear of these components. Therefore, the staff requested that the LRA specify loss of material due to wear as an aging effect for the reactor vessel flange and core support ledge. In addition the applicant was requested, in RAI 3.1.2-1 to discuss the inspections performed by the refueling activity procedures that monitors wear for these components or include the corresponding aging management program recommended by NUREG-1801 (AMP XI.M1, "Inservice Inspection").

In its response dated February 8, 2005, to supplemental RAI 3.1.2-1, the applicant stated that although wear of the reactor vessel flange and core support ledge is not expected to affect the intended function of these components, loss of material due to wear will be considered as an aging effect consistent with NUREG-1801, Item IV.A2.5-f. The aging effect will be managed by the Millstone inservice inspection program: reactor vessels internals AMP. The staff finds this response acceptable since it has identified the applicable aging effect along with an appropriate aging management program that is consistent with NUREG-1801 for these components. This resolves RAI 3.1.2-1.

NUREG-1801, Section IVB2.6-b specifies void swelling as an aging effect for the BMI guide tubes. Therefore, the applicant was requested in RAI 3.1.1-4 to modify Table 3.1.2-1 of the LRA to specify void swelling as an aging effect for the BMI guide tubes and provide a plant-specific aging management program as recommended by NUREG-1801 or provide justification for concluding that void swelling is not an aging effect.

In response to RAI 3.1.1-4 in a letter dated December 3, 2004, the applicant stated that the flux thimble guide tubes referred to in NUREG-1801 are a part of the reactor vessel internals instrumentation support structure. This subcomponent is included in the Millstone Unit 3 LRA Table 3.1.2-2 as “BMI Columns.” Void swelling has been identified for the BMI columns in accordance with NUREG-1801, Section IVB2.6-b, and is managed by the inservice inspection program: reactor vessel internals. The BMI guide tubes listed in Millstone Unit 3 LRA, Table 3.1.2-1, are external to the reactor vessel and are not subject to void swelling. The staff accepts this response, since the applicant has differentiated the BMI guide tube to be the external component, and the BMI columns as the internal component. Since the BMI columns are internal to the reactor vessel, void swelling is applicable and is identified in the LRA. Also, since the BMI guide tube is external to the reactor vessel, void swelling is not an applicable aging effect. Therefore, the applicant has specified the applicable aging effects and their corresponding AMPs for the BMI guide tubes and flux thimble tubes. This resolves RAI 3.1.1-4.

In Table 3.1.2-1, the applicant identified cracking as an aging effect requiring management for the CRDM pressure boundary components and the vessel head penetration components manufactured from stainless steel and nickel-based alloys that are exposed to treated water. The aging effect is managed by the inservice inspection program: systems, components and supports, and the chemistry control for primary systems program. The aging effect, material, and environment is consistent with NUREG 1801, Item IV.A2.2-a and Item IV.A2.2-b and no further evaluation is required. The staff notes that the inservice inspection program: systems, components and supports includes nickel-alloy nozzles and penetrations program. This program is used to manage PWSCC of nickel alloys. The staff concludes the inservice inspection program: systems, components and supports (which includes the nickel-alloy nozzles and penetrations program) and the chemistry control for primary systems program will be effective in managing cracking for the CRDM pressure boundary components and the vessel head penetrations.

Based on the above information, the staff finds the applicant’s management of cracking to be acceptable.

In Table 3.1.2-1, the applicant also identified loss of material as an aging effect requiring management for the CRDM pressure boundary components and the vessel head penetration components manufactured from stainless steel and nickel-based alloys that are exposed to treated water. The applicant stated the aging effect is managed by the chemistry control for primary systems program. The aging effect, material, and the environment is not addressed in NUREG 1801 for Item IV.A2.2-a and Item IV.A2.2-b. In RAI 3.1-B-1, the staff requested that the applicant provide justification on why the chemistry control for primary systems program alone is sufficient to manage loss of material without the need to credit an inspection-based AMP to verify that the chemistry control program is accomplishing its mitigative aging management function.

In response to RAI 3.1-B-1, in a letter dated December 3, 2004, the applicant stated that the stainless steel and nickel-based alloy materials exposed internally to primary treated water are not expected to be subject to significant loss of material as a result of corrosion. In addition, NUREG-1801 does not identify loss of material due to corrosion as an aging effect requiring management for these materials in the RCS. However, loss of material was conservatively considered in the Millstone LRA for the RCS components in the primary water environment. The chemistry control for primary systems program provides reasonable assurance that loss of material resulting from corrosion will not prevent these components from performing their intended functions.

Verification of the effectiveness of the chemistry control for primary systems program is provided by the work control process as described in LRA Appendix B, Section B2.1.5. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. The corrective actions program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for primary systems program. This resolves RAI 3.1-B-1.

In LRA Table 3.1.2-1, the applicant identified no aging effects for the following stainless steel, and nickel-based alloy reactor vessel component types exposed externally to air: CRDM pressure housings, instrument tubes extension (top head), instrumentation tubes (bottom head), primary nozzle safe-end, seal table and fitting, and instrument tubes. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. These components are exposed to high temperature internal flow, which causes a dry air environment. Stainless steel and nickel-based alloy are not susceptible to general corrosion that would affect the intended function of components in an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In LRA Table 3.1.2-1, the applicant proposed to manage loss of material for the following stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel component types of the reactor vessel - core support pads, bottom-mounted instrumentation (BMI) flux thimble tube, CRDM pressure housings, instrument tubes extension (top head), instrumentation tubes (bottom head), primary nozzles (and cladding), primary nozzle safe-end, seal table and fitting, instrument tubes, bottom head (and cladding), closure head dome (and cladding), closure head flange (and cladding), intermediate and lower shell (and cladding), and vessel flange and core support ledge (and cladding) - exposed internally to treated, borated water using the AMP B2.1.5, "Chemistry Control for Primary Systems Program." The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. On the basis of its review, the staff finds this program acceptable for managing loss of material for the above component types.

In LRA Table 3.1.2-1, for each of these same component and material combinations, the applicant is also managing cracking using AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and AMP B2.1.18, “Inservice Inspection Program: Systems, Component and Supports.” AMP B2.1.18 is also credited with managing the effects of PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals. The staff accepted the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program and its evaluation of these programs is documented in Sections 3.0.3.2.2 and 3.0.3.2.13 of this SER, respectively. The staff’s evaluation of the Alloy 600 base metal and Alloy 82/182 weld metals portion of the MPS AMP is discussed in Section 3.0.3.2.13 of this SER. The staff finds that the applicant manages cracking in a manner consistent with the GALL Report.

On the basis that cracking of stainless steel, nickel-based alloy, and low-alloy steel clad with stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel and nickel-based alloy components are not significant in chemically treated, borated water, the staff finds that the water chemistry control program is acceptable for managing loss of material.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3.2 Reactor Vessel Internals - Aging Management Evaluation - Table 3.1.2-2

In Section 3.1.2.1.2 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor vessel internals and associated pressure boundary components:

- chemistry control for primary systems program
- inservice inspection program: reactor vessel internals

In Table 3.1.2-2 of the LRA, the applicant provided a summary of AMRs for the reactor vessel internals and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed LRA Table 3.1.2-2, which summarizes the results of AMR evaluations for the reactor vessel internals component groups.

LRA Section 3.1.2.2.7.1 states that the reactor vessel flange leak detection line is not within the scope of license renewal because it does not meet the criteria of 10 CFR 54.4(a) as an intended function. However, NUREG-1801, Section IV A.2.1-f specifies this component is in scope and is subject to a crack initiation and growth/stress corrosion cracking aging mechanism. Therefore, the applicant was requested in RAI 3.1.2-6 to provide a plant-specific aging management program as recommended by NUREG-1801 for cracking of this component.

In response to RAI 3.1.2-6, in a letter dated December 3, 2004, the applicant stated the reactor vessel leak detection system, including the leak detection line, is not within the scope of license renewal. As stated on page 3-18 in the Millstone Unit 3 LRA, the reactor vessel closure head and shell flanges are sealed by inner and outer hollow metallic O-rings. Any leakage through this seal arrangement is directed to the leakage detection system through a 3/16-inch hole in the vessel flange.

Leakage flow past the inner reactor vessel flange O-ring is limited in the event of seal failure by the 3/16-inch diameter hole in the reactor vessel flange which is smaller than the inside diameter of the leak detection line. Additionally, the potential flowrate through the 3/16-inch diameter hole in the flange is within the normal make-up capability of the chemical and volume control system such that the leak detection system doses not constitute the RCS pressure boundary. The failure of the leak detection system components has been evaluated and cannot affect the function of safety-related systems, structures or components. As such, the reactor vessel flange seal leak detection system, including the leak detection line does not meet the criteria of 10 CFR 54.4(a) and is not within the scope of license renewal. Therefore, the applicant stated that the system is not subject to aging management review and there is no aging management program applicable to the leak detection line. The staff review to determine if this is acceptable is not yet complete. This is Open Item 3.1.2-6.

In LRA Table 3.1.2-2, the applicant proposed to manage loss of material for the following stainless steel component types of the reactor vessel internals system - baffle/former plates, BMI columns, core barrel, core barrel flange, core barrel outlet nozzles, head and vessel alignment pins, hold-down spring, lower fuel alignment pins, lower support forging, lower support plate column bolts, lower support plate columns, neutron panel, radial support keys, rod cluster control assembly (RCCA) guide tube support pins, RCCA guide tubes, secondary core support, upper core plate, upper core plate alignment pins, upper fuel alignment pins, upper instrumentation columns, upper support column, and upper support plate - exposed internally to treated, borated water using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The staff accepted the chemistry control for primary systems program and its evaluation of this program is documented in Section 3.0.3.2.2 of this SER.

In LRA Table 3.1.2-2, for each of these same component and material combinations, the applicant is also managing cracking using AMP B2.1.5, “Chemistry Control for Primary Systems Program,” and AMP B2.1.17, “Inservice Inspection Program: Reactor Vessel Internals.” AMP B2.1.17 credits the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspections and additional examinations based on future industry developments. The staff reviewed the embrittlement effects of CASS portion of the inservice inspection program: reactor vessel internals program and its evaluation of this part of the program is documented in Section 3.0.3.2.12 of this SER. The staff’s evaluation of the PWR internals aging effects management regarding such issues as void swelling (change in dimensions), stress corrosion cracking (PWSCC and IGSCC), and loss of preload is documented in Section 3.0.3.2.12 of the SER. The staff finds that the applicant manages cracking in a manner consistent with the GALL Report. In addition, the staff reviewed the applicable part of MPS AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” which discusses the ASME Section XI, Subsection IWB, Category B-N-3 inservice inspection activities. The staff accepted this program and its evaluation is documented in Section 3.0.3.2.13 of this SER.

On the basis that cracking of stainless steel is being managed by the water chemistry control and inservice inspection programs, and the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated, borated water, the staff finds that management of loss of material using water chemistry control is acceptable.

The GALL Report recommends a loose parts monitoring program to manage loss of mechanical closure integrity for the following reactor vessel internals component types - CEA shroud extension shaft guides, cylinders, and bases; shroud base; shroud flow channel; shroud flow channel cap; shroud shaft retention pin; shroud retention block; spanner nuts; shroud fasteners; guide tubes; ICI thimble support plate assembly; ICI support plate, grid, lifting support, lifting plate, column, plates, and funnel; pad, ring, nipple, hex bolt, and spacer; threaded rod, hex jam nut, thimble support nut, and cap screws.

In the LRA, the applicant proposed to manage this aging effect using MPS AMP B2.1.17, "Inservice Inspection Program: Reactor Vessel Internals." The staff reviewed and accepted this program and its evaluation is documented in Section 3.0.3.2.12 of this SER.

On the basis that the reactor vessel internals programs detect aging effects prior to the loss of mechanical integrity of these components, the staff finds that its use in lieu of a loose parts monitoring program is acceptable.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.B2.3.3 Reactor Coolant - Aging Management Evaluation - Table 3.1.2-3

In Section 3.1.2.1.3 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the reactor coolant system and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- closed-cycle cooling water system
- general condition monitoring
- inservice inspection program: systems, components and supports
- work control process

In Table 3.1.2-3 of the LRA, the applicant provided a summary of AMRs for the reactor coolant system and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

The staff reviewed LRA Table 3.1.2-3, which summarizes the results of AMR evaluations for the RCS component groups.

In Table 3.1.2-3, the applicant also identified loss of material as an aging effect requiring management for the RCS components manufactured from stainless steel and nickel-based alloys that are exposed to treated water. The applicant stated the aging effect is managed by the chemistry control for primary systems program. The aging effect, material, and the environment is not addressed in NUREG 1801 for the subject material/environment combination. In RAI 3.1-A-1 the staff requested that the applicant provide justification on why the chemistry control for primary systems program alone is sufficient to manage loss of material without the need to credit an inspection-based AMP to verify that the chemistry control program is accomplishing its mitigative aging management function.

In response to RAI 3.1-A-3, in a letter dated December 3, 2004, the applicant stated that the stainless steel and nickel-based alloy materials exposed internally to primary treated water are not expected to be subject to significant loss of material as a result of corrosion. In addition, NUREG-1801 does not identify loss of material due to corrosion as an aging effect requiring management for these materials in the RCS. However, loss of material was conservatively considered in the Millstone LRA for the RCS components in the primary water environment. The chemistry control for primary systems program provides reasonable assurance that loss of material resulting from corrosion will not prevent these components from performing their intended functions.

Verification of the effectiveness of the chemistry control for primary systems program is provided by the work control process as described in LRA Appendix B, Section B2.1.5. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. The corrective actions program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

In LRA Table 3.1.2-3, the applicant identified no aging effects for the following stainless steel, nickel-based alloy, and carbon steel component types of the RCS exposed externally to air: flow elements, flow indicators, flow orifices, piping, tubing, valve; pressurizer nozzles, safe-ends, and instruments and heaters (wells and sheathes), manway cover and insert; reactor coolant pressurizer relief tank, RCP seal coolers, RCP thermal barriers, RCP casing, RCP rupture disks. Air is not identified in the GALL Report as an environment for these components and materials.

In the LRA, the applicant stated that the RCS stainless steel components are externally insulated. The applicant’s FSAR concludes (page 5-6) that the use of external thermal insulation of RCS in conformance with RG 1.36 provides reasonable assurance that the reactor coolant pressure boundary material will be adequately protected from conditions that would lead to loss of integrity from stress corrosion. Based on its review of the applicant’s FSAR, the staff agrees with the applicant that the RCS stainless steel components are adequately protected from conditions that could lead to loss of integrity from stress corrosion.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. These RCS components are exposed to high temperature internal flow, which creates a high temperature dry air environment, and general corrosion is not likely to occur under such an environment. Additionally, stainless steel and nickel-based alloys in a dry air environment are not susceptible to general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In LRA Table 3.1.2-3 (page 3-90), the applicant stated that cracking of the CASS RCP thermal barrier exposed to treated water is to be managed by the chemistry control for primary systems program and the inservice inspection program: systems, components and supports program. During the audit, the staff asked the applicant to clarify which part of the inservice inspection program is being credited with managing the aging effect for the RCP thermal barrier. The applicant responded as follows:

> It was confirmed with the inservice inspection coordinator that the inservice inspection program does not perform examinations associated with the thermal barriers. The work control process program is credited for managing the effects of aging for the reactor coolant pump thermal barriers. The reactor coolant pumps are refurbished, designated as spares, and reinstalled during future outages. Examples of work orders are identified where through the work control process program the thermal barriers associated with spare RCPs are blown down of the closed cooling water and a sample of the closed cooling water is taken. (See automated work orders M3-97-17720 through M3-97-17723.)

The applicant, in an LRA supplement dated July 7, 2004, also stated that:

> Note 6 should be added for Unit 3 LRA Table 3.1.2-3 (page 3-90) for the RCS component group 'RCP Thermal Barriers' and aging effect 'Loss of Fracture Toughness.' The Note for this item is revised by Item 42-1 of this clarification letter and is applicable to this component because it is CASS material.
>
> The “Inservice Inspection Program: Systems, Components and Supports” should be replaced by the “Work Control Process” for Unit 3 Table 3.1.2-3 (page 3-90), for the RCS component group 'RCP Thermal Barriers' and aging effect 'Cracking.' The Note for this item should be “E” in the Unit 3 LRA. Also, the “Discussion” column in Unit 3 Table 3.1.1, Item 3.1.1-36 (page 3-34), should read as follows:
>
>> Not consistent with NUREG-1801. Cracking is managed with the chemistry control for primary systems program and the inservice inspection program: systems, components and supports except for the RCP thermal barriers, which are managed with chemistry, and the work control process. These programs take some exceptions to the NUREG-1801 AMPs.

The staff reviewed the work control process program and the applicant’s RRN-129 document, “Reactor Coolant Pump Motor Refurbishment Report for Millstone Unit,” and determined that the applicant has demonstrated that the effects of aging of RCP thermal barriers will be adequately managed.

The staff reviewed thermal sleeves for the pressurizer surge nozzle and spray nozzle, LRA Table 3.1.2-3 (page 3-92), and identified that the weld material is of nickel-based alloy 82/182 material and that these locations are not covered by the nickel-based alloy aging management activities. The applicant stated that it will evaluate this area as part of extent of condition when responding to NRC Inspections and Enforcement Bulletin 2004-1, “Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors,” dated May 28, 2004, as part of the CLB. This commitment is identified on the applicant’s license renewal commitment list in the LRA, Appendix A, Table A6.0-1, Item 15.

On the basis of its review of the LRA commitment and Bulletin 2004-1, the staff determined that this issue is part of the CLB to be resolved with the applicant’s response to Bulletin 2004-1.

Table 3.1.2-3 of the LRA specifies the use of AMP B2.1.18, “Inservice Inspection Program: Systems, Components and Supports,” for closure bolting in the reactor coolant pump, valves, and pressurizer manways. In addition, Section B2.0 of Appendix B of the LRA states that the aging management review did not identify the need for the AMP. However, NUREG-1801, sections IVC2.3-e, IVC2.3-g, IVC2.4-e, IVC2.4-g, IVC2.5-n, and IVC2.5-p, specifies the use of AMP XI.M18 for these components. AMP XI.M18 of NUREG-1801 incorporates the requirements and guidelines of NUREG-1339, EPRI NP-5769, and EPRI TR-104213 concerning material selection, bolting preload control, inservice inspections, plant operation and maintenance, and evaluation of the structural integrity of bolted joints. Therefore, the applicant was requested in RAI 3.1.3-1 to provide the AMP as recommended by NUREG-1801, or include all of the necessary information discussed above in AMP B2.1.18 of the LRA.

In response to RAI 3.1.3-1, in a letter dated December 3, 2004, the applicant stated that it has developed a specific AMP to manage the aging effects for closure bolting in the reactor coolant pump, valves and pressurizer manway. This response is acceptable since the applicant will manage the closure bolting of these components with an AMP, as specified in NUREG-1801. The AMP is evaluated in Section 3.0.3.2.18 of this SER.

For the CASS spray head assembly identified in Table 3.1.2-3 of the LRA, the applicant specified the chemistry control AMP to manage cracking. NUREG-1801, Section IVC2.5-j, identifies a plant-specific AMP to be used to manage cracking. Therefore, the applicant was requested in RAI 3.1.3-2 to provide this AMP to the NRC for evaluation as recommended by NUREG-1801, Section IVC2.5-j.

In response to RAI 3.1.3-2, in a letter dated December 3, 2004, the applicant stated that material for the Millstone Unit 3 pressurizer spray head is CASS. The plant-specific aging management program for managing the aging effects associated with the pressurizer spray head is the chemistry control for primary systems program.

The reactor coolant system stainless steel materials, including the pressurizer spray head, are exposed internally to a high-quality primary water and/or steam environment that is not expected to result in significant SCC.

Therefore, the applicant stated that the chemistry control for primary systems program AMP provides reasonable assurance that cracking resulting from SCC will not prevent the spray head from performing its intended function. In Section 3.1.2.2.7 of NUREG-1800, the staff recommended that a plant-specific aging management program be proposed to manage crack initiation and unacceptable crack growth in pressurizer spray heads because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC. This inspection should be capable of detecting and resolving cracks in the pressurizer spray heads. Therefore, the staff agreed that the water chemistry can be used to mitigate SCC, but an inspection was necessary to indicate whether the water chemistry has prevented SCC and to characterize any cracking in the CASS pressurizer spray heads.

In its response to supplemental RAI 3.1.3-2B, dated February 8, 2005, the applicant committed to either replace the Millstone Unit 3 pressurizer spray head assembly or inspect it utilizing the best available inspection techniques (at the time of inspection) for detecting SCC, prior to entering the period of extended operation. This commitment has been identified in the Millstone LRA, Appendix A, Table A6.0-1 as Item 37 in the License Renewal Commitments Table. The staff finds this response acceptable because the applicant will either verify that its water chemistry program is effective in preventing SCC by performing an inspection of the assembly, or replace the CASS pressurizer spray head assembly prior to entering the period of extended of operation. This resolves RAI 3.1.3-2B.

The staff requested additional information from the applicant in order to determine which components are susceptible to PWSCC and the appropriate AMP as recommended by NUREG-1801, Section IVC.2.5-k. Therefore, the applicant was requested in RAI 3.1.3-3 to specify which of these components (safe-ends for surge, spray, relief and safety) in Table 3.1.2-3 of the LRA are nickel-based and which are stainless steel. In addition, the applicant was asked if the surge line nozzle and safe-end cast austenitic steel (CASS). If the component is CASS, then provide a plant-specific aging management program for cracking as recommended by NUREG-1801, Section IVC2.5-I.

In response to RAI 3.1.3-3, in a letter dated December 3, 2004, the applicant stated that the safe-ends for the Millstone Unit 3 pressurizer surge, spray, relief, and safety nozzles are fabricated from stainless steel. The transition welds between these stainless steel safe-ends and the low-alloy steel of the pressurizer nozzles are nickel-based alloy. Neither the surge line nozzle nor the safe-end is fabricated from CASS. The aging effect of cracking for these components is managed by the chemistry control for primary systems program and the inservice inspection program: systems, components, and supports. The Millstone Unit 3 LRA (Appendix A, Table A6.0-1, commitment 15) states that Millstone Unit 3 will participate in industry programs to determine appropriate measures to manage PWSCC and submit an appropriate AMP to the NRC staff for approval prior to entering the extended period of operation. This resolves RAI 3.1.3-3.

Table 3.1.2-3 of the Millstone Unit 3 LRA does not specify the pressurizer integral support that is subject to fatigue, cracking/IASCC, and boric acid corrosion. The applicant was requested in RAI 3.1.3-4 to include these aging effects and provide the necessary aging management programs in the LRA for this component as identified by NUREG-1801, item IV.C.2.5.12.

In response to RAI 3.1.3-4, in a letter dated December 3, 2004, the applicant stated that the integral supports identified in NUREG-1801 are considered to be the same as the component type “Pressurizer (Seismic Lugs)” and “Pressurizer (Support Skirt and Flange)” in the Millstone Unit 3 LRA, Table 3.1.2-3. The aging effects of loss of material due to boric acid corrosion and cracking are identified for these components consistent with NUREG-1801, Item IV.C.2.5.12. Fatigue is addressed as a TLAA and is identified in LRA Table 3.1.1, item 3.1.1-10.

Because the pressurizer seismic lugs, support skirt and flange are the integral supports, and are identified in the LRA, along with the applicable AMPs consistent with NUREG-1801, the staff finds this response acceptable. This resolves RAI 3.1.3-4.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3.4 Steam Generators - Aging Management Evaluation - Table 3.1.2-4

In Section 3.1.2.1.4 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects requiring management for the steam generator and associated pressure boundary components:

- boric acid corrosion
- chemistry control for primary systems program
- chemistry control for secondary systems program
- flow-accelerated corrosion
- inservice inspection program: systems, components and supports
- steam generator structural integrity

In Table 3.1.2-4 of the LRA, the applicant provided a summary of AMRs for the steam generator and associated pressure boundary components and identified which AMRs it considered to be consistent with the GALL Report.

Millstone Unit 3 has four Westinghouse Model F steam generators. Each SG contains 5626 thermally treated Alloy Inconel 600 tubes. Each tube has a nominal outside diameter of 0.688 inch and a nominal wall thickness of 0.040 inch. The tubes were hydraulically expanded at both ends for the full length of the tubesheet and are supported by a number of stainless steel Type 405 tube support plates with quatrefoil-broached holes and upper support anti-vibration bars.

The staff reviewed the LRA Table 3.1.2-4, which summarizes the results of AMR evaluations for the steam generator component groups.

In LRA Table 3.1.2-4, the applicant identified cracking as an aging effect and the inservice inspection as the AMP for the primary manway bolting in the air environment. In RAI 3.1.2-4-3, the staff asked the applicant to clarify the aging mechanism for cracking and to explain how the Inservice Inspection AMP is used to manage this aging effect similar to the recommended AMP in the GALL.

By letter dated December 3, 2004, the applicant responded that consistent with GALL, the aging mechanism for the primary manway bolting is stress corrosion cracking, which can result from flaw initiation and growth. The applicant stated that it will implement a program to manage the aging effect of stress corrosion cracking as stated in GALL IV.D1.1-I. The staff finds the applicant’s response acceptable because it is consistent with GALL.

In LRA Table 3.1.2-4, the applicant identified the only aging effect as cracking and the inservice inspection program as the AMP for the secondary manway and handhole bolting in the air environment. In RAI 3.1.2-4-4, the staff asked the applicant to justify why loss of preload and stress relaxation are not applicable aging effects as stated in GALL IV.D1.1-f.

By letter dated December 3, 2004, the applicant responded that loss of preload due to stress relaxation is not an applicable aging effect for the ASME Class 2 secondary manway and handhole bolting. The applicant uses SA-193, Grade B7 bolting for these applications. The applicant stated that, according to ASME Section II, Part D, Table 4, stress relaxation may occur at temperatures of 700 °F or higher for Grade B7 bolting materials. The applicant's normal operating RCS hot leg temperature, which bounds the maximum temperature for the SG secondary side components, is 600.5 °F for Unit 2 and 618 °F for Unit 3.

The applicant stated that since these temperatures are below the 700 °F, loss of preload due to stress relaxation is not an aging effect requiring aging management. The staff reviewed the operating thresholds and footnotes for stress relaxation in Section II of the ASME Boiler and Pressure Vessel Code for these bolting materials and confirmed that the applicant's determination is valid. The staff finds the applicant's response acceptable because the bolts will not be exposed to temperatures in excess of the threshold for stress relaxation in the bolting materials.

In LRA Table 3.1.2-4, the applicant identified loss of material as the aging effect for the tube supports lattice rings. In RAI 3.1.2-4-5, the staff stated that cracking is also a potential aging effect and therefore asked the applicant to justify why cracking is not considered as an aging effect for the tube support lattice rings under treated water and steam.

By letter dated December 3, 2004, the applicant responded that only high-strength carbon steels are susceptible to this stress corrosion cracking in this environment. Since the tube support lattice rings are made of carbon steel and not high strength carbon steel, they are not susceptible to stress corrosion cracking under the steam generator secondary-side environment. The staff finds the applicant's response acceptable because based on operating experience, carbon steel is not likely to be susceptible to stress corrosion cracking under the steam generator secondary-side environment.

In LRA Table 3.1.2-4, the applicant identified no aging effects for the following stainless steel and low-alloy steel component types of the steam generator exposed externally to air: feedwater nozzle and safe-end, lower head drain nozzle, primary manway cover and diaphragm, secondary manway and handhole covers, secondary-side nozzles (except main steam and feedwater), steam nozzle and safe-end, top head, transition cone, and upper and lower shell. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that dry air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air which is the reactor building air environment. Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a dry air environment.

In LRA Table 3.1.2-4, the applicant proposed to manage loss of material for the following stainless steel, carbon steel, low-alloy steel, and nickel-based alloy component types of steam generator - anti-vibration bars, divider plate, feedwater inlet ring and support, feedwater nozzle and safe-end, lower head (and cladding), lower head drain nozzle, primary manway cover and diaphragm, primary nozzle and safe-end, secondary manway and handhole covers, secondary-side nozzles (except main steam and feedwater), stay rod (including spacer pipes and nuts), steam nozzle and safe-end, steam nozzle flow restrictor, top head, tube plugs, tube support plates, tube sheet (and cladding), upper and lower shell, and wrapper (includes jacking blocks, jacking block studs, anti-rotation block, and cone) - exposed to treated water/steam, borated water using the water chemistry control programs. Additionally, the tube sheet and steam generator U-tubes are managed by the steam generator structural integrity program. The staff accepted AMP B2.1.5, "Chemistry Control for Primary Systems Program," and AMP B2.1.6,"Chemistry Control for Secondary Systems Program," and its evaluation of these AMPs is documented in Sections 3.0.3.2.2 and 3.0.3.2.3 of this SER, respectively. The steam generator structural integrity program is reviewed and evaluated in Section 3.0.3.1 of this SER.

On the basis of industry operating experience with this material and use of water chemistry control programs consistent with the GALL Report, the staff finds this to be acceptable.

In LRA Table 3.1.2-4 (page 3-98), the applicant stated that cracking of the nickel-based alloy steam generator primary manway cover and diaphragm is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” During the audit and review, the staff asked the applicant to provide justification for using the chemistry control for primary systems program to prevent PWSCC. In its response, the applicant stated that:

> Based on a review of the Bill of Materials (BOM) database, part number information, and the vendor technical manual (figure 8-3 sheet 2 of 2, Detail C), it was determined that Unit 3 has stainless steel diaphragms (inserts) as part of the steam generator primary manway cover assemblies. The Unit 3 LRA AMR Table currently identifies the diaphragm as a nickel-based alloy. The AMR Table needs to be revised to identify stainless steel in lieu of a nickel-based alloy for the diaphragms, and also clarify that the diaphragm is also referred to as an insert.

In an LRA supplement dated July 7, 2004, the applicant stated as follows:

> The material “Nickel-based Alloy” should be “Stainless Steel” for the 'Primary Manway Cover and Diaphragm' component group in Unit 3 Table 3.1.2-4 (page 3-98).

The applicant also stated that the primary manway is not included in the inservice inspection program; however, the component is inspected each time the manway is opened. On the basis of its review, the staff finds this to be acceptable.

In LRA Table 3.1.2-4 (page 3-95), the applicant proposed to manage cracking for the nickel-based alloy divider plate exposed to borated water using water chemistry control programs. During the audit and review, the staff asked the applicant to provide justification for using the chemistry control for primary systems program to prevent PWSCC. In its response during the audit, the applicant stated that:

> The steam generator divider plate is located in the steam generator channel head and functions to direct reactor coolant flow through the steam generator tubes (flow distribution). The plate is welded to the primary side of the tube sheet and to the inside of the steam generator channel head. The divider plate material is ASTM SB-168 (Alloy 600) and the weld material is Alloy 82/182. The divider plate, and associated welds, do not penetrate the steam generator

> pressure-retaining boundary. Since the steam generator divider plates, and associated attachment welds, are not pressure retaining these components are not included within the scope of the Unit 3 response to the generic issue related to Alloy 600 degradation (PWSCC). Cracking of the welds cannot result in leakage of borated water onto carbon steel pressure-retaining material, such that wastage due to boric acid corrosion will not occur. The intended function identified for the divider plate is flow distribution. Gross failure of the welds would be required before divider plate deflection that is sufficient to affect the intended function could occur. Additionally, there is no known industry operating experience with failures of steam generator divider plates or welds from PWSCC.

During the audit, the applicant also stated that this component is inspected under the steam generator inspection program. The staff reviewed the applicant's program as documented in the audit and review report and finds that the applicant adequately manages this aging effect.

On the basis of its review, the staff finds that management of cracking in low-alloy steel and carbon steel exposed to treated water using water chemistry control verified by inservice inspection is acceptable as recommended by the GALL Report.

The staff also finds that management of cracking in stainless steel exposed to treated water using the chemistry control for secondary systems program is acceptable as recommended by the GALL Report.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

All other AMRs assigned to the staff in Tables 3.1.2-1 through 3.1.2-4 were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effects requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.3 Conclusion

The staff concluded that the applicant provided sufficient information to demonstrate that the effects of aging for the of the reactor vessel, internals, and reactor coolant system components and component types that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the reactor vessel, internals, and reactor coolant system components, as required by 10 CFR 54.21(d).

3.2 Aging Management of Engineered Safety Features Systems

3.2A Unit 2 Aging Management of Engineered Safety Features Systems

This section of the SER documents the staff's review of the applicant's AMR results for the engineered safety features (ESF) systems components and component groups associated with the following systems:

- containment spray system
- safety injection system
- refueling water storage tank and containment sump system
- shutdown cooling system
- spent fuel pool cooling system

3.2A.1 Summary of Technical Information in the Application

In LRA Section 3.2, the applicant provided AMR results for ESF systems components and component groups. In LRA Table 3.2.1, "Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the ESF systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of aging effects requiring management (AERMs). These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.2A.2 Staff Evaluation

The staff reviewed LRA Section 3.2 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the ESF systems components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did confirm that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. The staff's audit evaluation are documented in the MPS audit and review report and are summarized in Section 3.2A.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.2.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear

Power Plants," dated July 2001. The staff's audit evaluation are documented in the MPS audit and review report and are summarized in and summarized in Section 3.2A.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not address in the GALL Report. The review included evaluating whether all plausible aging effects were identified and whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluation are documented in the MPS audit and review report and are summarized in Section 3.2A.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.2A.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the ESF system components.

Table 3.2A-1 provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.2 that are addressed in the GALL Report.

Table 3.2A-1 Staff Evaluation for Engineered Safety Features System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Piping, fittings, and valves in emergency core cooling system (Item Number 3.2.1-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3A, Metal Fatigue
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling system (Item Number 3.2.1-03)	Loss of material due to general corrosion	Plant-specific		Not applicable (See Section 3.2A.2.2.2)
Components in containment spray (PWR only), standby gas treatment (BWR only), and emergency core cooling systems (Item Number 3.2.1-05)	Loss of material due to pitting and crevice corrosion	Plant-specific	Chemistry control for primary systems program (B2.1.5); Tank inspection program (B2.1.24)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Containment isolation valves and associated piping (Item Number 3.2.1-06)	Loss of material due to MIC	Plant-specific	Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.4)
High pressure safety injection (charging) pump mini-flow orifice (Item Number 3.2.1-08)	Loss of material due to erosion	Plant-specific		Not applicable (See Section 3.2A.2.2.5) The HPSI pumps are not used for normal charging.
External surface of carbon steel components (Item Number 3.2.1-10)	Loss of material due to general corrosion	Plant-specific	General condition monitoring (B2.1.13)	Consistent with GALL, which recommends further evaluation (See Section 3.2A.2.2.2)
Piping and fittings of CASS in emergency core cooling systems (Item Number 3.2.1-11)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1)
Components serviced by open-cycle cooling system (Item Number 3.2.1-12)	Loss of material due to general pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system		Not applicable There are no ESF components in open-cycle cooling water environments.
Components serviced by closed-cycle cooling system (Item Number 3.2.1-13)	Loss of material due to general pitting, and crevice corrosion	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1)
Pumps, valves, piping, and fittings, and tanks in containment spray and emergency core cooling systems (Item Number 3.2.1-15)	Crack initiation and growth due to SCC	Water chemistry	Chemistry control for primary systems program (B2.1.5); Chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.2A.2.1)
Carbon steel components (Item Number 3.2.1-17)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3); General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.2A.2.1.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Closure bolting in high-pressure or high-temperature systems (Item Number 3.2.1-18)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting integrity (B2.1.26)	Consistent with GALL (See Section 3.2A.2.1.2)

The staff's review of the Millstone ESF systems and associated components followed one of several approaches. One approach, documented in Section 3.2A.2.1, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.2A.2.2, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.2A.2.3, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the ESF systems components is documented in Section 3.0.3 of this SER.

3.2A.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In LRA Section 3.2.2.1, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the ESF systems components:

- boric acid corrosion program
- chemistry control for primary systems program
- closed-cycle cooling water system program
- general condition monitoring program
- inservice inspection program: systems, components and supports program
- tank inspection program
- work control process program
- bolting integrity program

Staff Evaluation. In Tables 3.2.2-1 through 3.2.2-5 of the LRA, the applicant provided a summary of AMRs for the ESF systems and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report. The staff confirmed that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to confirm consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect; but a different aging management program is credited. The staff audited these line items to confirm consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.2A.2.1.1 Loss of Material Due to Boric Acid Corrosion

In LRA Table 3.2.1, Item 3.2.1-17, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, “Boric Acid Corrosion Program,” and MPS AMP B2.1.13, “General Condition Monitoring Program.” The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting system components. The boric acid corrosion program is evaluated in Section 3.0.3.1.2 of this SER.

The general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit, the staff asked the applicant for clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. During the audit, further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. During the audit, the applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program in that general condition monitoring program inspections identify borated water leakage and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, the leak is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

In the LRA, the applicant stated that for those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. No infrequently accessed areas with systems containing borated water are identified for Unit 2. The staff’s evaluation of the general condition monitoring program is documented in Section 3.0.3.3.2 of this SER. Based on the applicant’s response and review of the general condition monitoring program, the staff concluded that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

3.2A.2.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In LRA Table 3.2.1, Item 3.2.1-18, the applicant stated that bolting in the ESF systems is not subject to wetted conditions; therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in ESF systems is not identified as an aging effect requiring management.

The staff noted that Standard Review Plan for License Renewal (SRP-LR) Table 3.2-1 recommended GALL AMP XI.M18," for managing closure bolting in a high-pressure or high-temperature system for loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or stress corrosion cracking (SCC).

The staff questioned the applicant on whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted an LRA supplement. in which it stated that it has developed a specific aging management program that addresses degradation of bolting at MPS. The program is addressed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of LRA Table 3.2.1, Item 18, with "consistent with the NUREG-1801."

The staff reviewed the applicant's response, and finds this acceptable since it is consistent with the GALL Report.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.2.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further staff review is required. On the basis of its audit and review, the staff concluded that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In LRA Section 3.2.2.2, the applicant provided further evaluation of aging management as recommended by the GALL Report for ESF systems. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general corrosion
- local loss of material due to pitting and crevice corrosion
- local loss of material due to microbiologically influenced corrosion(MIC)
- local loss of material due to erosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.2.2.2 of the SRP-LR. Details of the staff's audit and review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.2A.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.2A.2.2.2 Loss of Material Due to General Corrosion

The staff reviewed LRA Section 3.2.2.2.2 against the criteria in SRP-LR Section 3.2.2.2.2.

In LRA Section 3.2.2.2.2, the applicant addressed loss of material due to general corrosion that could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components.

SRP-LR Section 3.2.2.2.2.2 states that loss of material due to general corrosion could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect is adequately managed.

The applicant stated in the LRA, that for loss of material from internal surfaces, this SRP-LR item applies to carbon steel containment spray headers, nozzles, and valves; and to carbon steel containment isolation piping and valves. The containment spray headers, nozzles, and valves and containment isolation components in the ESF systems, are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components associated with other plant systems are evaluated for the effects of aging along with the host system to which they are assigned.

For loss of material from external surfaces, this item applies to carbon steel ESF components. Loss of material from external surfaces due to general corrosion is applicable to carbon steel (including cast iron and low-alloy steel) components in an air environment when exposed to intermittent wetting conditions. For these components, loss of material from external surfaces is managed by MPS AMP B2.1.13, "General Condition Monitoring Program."

The staff concluded that loss of material due to general corrosion does not apply to stainless steel components.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

On the basis of its review of the general condition monitoring program, the staff finds that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion, as recommended in the GALL Report.

3.2A.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion

The staff reviewed LRA Section 3.2.2.2.3.2 against the criteria in SRP-LR Section 3.2.2.2.3.

In LRA Section 3.2.2.2.3.2, the applicant addressed local loss of material from pitting and crevice corrosion that could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the refueling water storage tank (RWST) external surface.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material from pitting and crevice corrosion could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the refueling water tank external surface. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that containment isolation components are potentially subject to a loss of material due to pitting and crevice corrosion. Loss of material for these components is managed by AMP B2.1.5, "Chemistry Control for Primary Systems Program."

Also, the external bottom surface of the RWST is potentially subject to a loss of material due to pitting and crevice corrosion. Loss of material of the external surface of the RWST bottom is managed by AMP B2.1.24, "Tank Inspection Program."

The applicant stated, in the LRA, that the chemistry control for primary systems program is consistent with the GALL Report with an exception. The staff reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to a later revision of the Electric Power Research Institute (EPRI) guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program acceptable for managing this aging effect for the above components.

The staff reviewed the tank inspection program, which includes an enhancement to measure wall thickness to detect significant loss of material of the RWST bottom surface; and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds the program acceptable for managing loss of material due to pitting and crevice corrosion.

3.2A.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion

The staff reviewed LRA Section 3.2.2.2.4 against the criteria in SRP-LR Section 3.2.2.2.4.

In LRA Section 3.2.2.2.4, the applicant addressed local loss of material due to microbiologically influenced corrosion (MIC). SRP-LR Section 3.2.2.2.4 states that containment isolation valves and associated piping in systems could incur a local loss of material due to MIC that is not addressed in other chapters of the GALL Report. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that the containment isolation components are potentially subject to a loss of material due to MIC. Loss of material for these components is managed by AMP B2.1.5, "Chemistry Control for Primary Systems Program."

The applicant stated, in the LRA, that the chemistry control for primary systems program is consistent with the GALL Report with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to a later revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program acceptable for managing this aging effect.

3.2A.2.2.5 Local Loss of Material Due to Erosion

The staff reviewed LRA Section 3.2.2.2.6 against the criteria in SRP-LR Section 3.2.2.2.6.

In LRA Section 3.2.2.2.6, the applicant addressed local loss of material due to erosion that could occur in the HPSI miniflow orifice.

SRP-LR Section 3.2.2.2.6 states that local loss of material due to erosion could occur in the high-pressure safety injection (HPSI) pump miniflow orifice. This aging mechanism and its effect will apply only to pumps that are normally used as charging pumps in the chemical and volume control systems. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that the normal charging function is accomplished with positive displacement charging pumps. The centrifugal HPSI pumps are not used for normal charging. Therefore, this issue is not applicable to Unit 2.

Since this aging effect would apply to high head charging pumps only, the staff finds that loss of material due to erosion is not applicable to positive displacement charging pumps.

3.2A.2.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff's evaluation of the applicant's Quality Assurance Program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.2.2-1 through 3.2.2-5 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effects requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In Tables 3.2.2-1 through 3.2.2-5, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report, and it provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

3.2A.2.3.1 Containment Spray - Aging Management Evaluation - Table 3.2.2-1

The staff reviewed LRA Table 3.2.2-1, which summarized the results of AMR evaluations for the containment spray system component groups.

The applicant has not identified in the LRA any aging effect for low-alloy and stainless steel components exposed to air, including bolting, orifice, piping, pump casing, tubing, spray nozzles, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environments being referred to is typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant amounts of corrosion of low-alloy steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposes to manage loss of material of the stainless steel orifice, piping, pump casing, tubing, and valve component types exposed to treated water (chemically treated borated water) using only MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to a later revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff finds the chemistry control for primary systems program acceptable for managing this aging effect.

3.2A.2.3.2 Safety Injection - Aging Management Evaluation - Table 3.2.2-2

The staff reviewed LRA Table 3.2.2-2, which summarizes the results of AMR evaluations for the safety injection system component groups.

The applicant identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including flow elements, flow orifices, pipe, pumps, tubing, valves, and safety injection tanks (carbon steel with SS clad) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environment being referred to is typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for stainless steel (SS) components exposed internally to gas, including pipe and safety injection tanks (carbon steel with SS clad) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for metal in a gas environment.

3.2A.2.3.3 Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation - Table 3.2.2-3 and Table 3.2.2-3a

The staff reviewed Table 3.2.2-3 of the LRA and Table 3.2.2-3a in the applicant’s letter dated January 11, 2005, which summarizes the results of AMR evaluations for the refueling water storage tank (RWST) and containment sump component groups.

In the LRA and in the applicant’s letter, the applicant identified no aging effect for carbon steel, low-alloy steel, and stainless steel components exposed to air, including bolting, encapsulation piping and valves, pipe, rupture discs, trisodium phosphate dodecahydrate (TSP) basket, tubing, valves, RWST circulating pump, RWST heat exchanger (channel head), and RWST heat exchanger (shell) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant amounts of corrosion of carbon or low-alloy steel require an electrolytic environment and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon or low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concluded that it did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel vortex breakers component types exposed to treated water (chemically treated borated water) using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to a later revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff finds the chemistry control for primary systems program acceptable for managing this aging effect.

In the LRA, the applicant proposes to manage loss of material of stainless steel pipe, tubing, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring Program." The applicant stated that this is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation of this program is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposes to manage loss of material of carbon steel encapsulation piping and valve component group exposed internally to moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process." The applicant stated that this is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff concluded that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.2A.2.3.4 Shutdown Cooling - Aging Management Evaluation - Table 3.2.2-4

The staff reviewed Table 3.2.2-4 of the LRA, which summarizes the results of AMR evaluations for the shutdown cooling system component groups.

In the LRA, the applicant identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including carry-over tank, filters/strainers, flexible hose, flow elements, pipe, restricting orifice, tubing, vacuum flask, vacuum pump, valves, shutdown cooling heat exchangers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels, and cast austenitic stainless steel (CASS) are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concluded that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effect for stainless steel components exposed internally to air, including carry-over tank, filter/strainer, flexible hoses, vacuum flask, vacuum pump component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concluded that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel shutdown cooling heat exchangers (tubing) component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process." The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff concluded that the work control process program is acceptable for managing the aging effects of loss of materials.

3.2A.2.3.5 Spent Fuel Pool Cooling - Aging Management Evaluation - Table 3.2.2-5 and Table 3.2.2-5a

The staff reviewed Table 3.2.2-5 of the Millstone LRA and Table 3.2.2-5a of the applicant's letter dated January 11, 2005, which summarized the results of AMR evaluations for the spent fuel pool cooling system component groups.

In the LRA and in the applicant's letter dated January 11, 2005, the applicant identified no aging effect for low-alloy and stainless steel components exposed to air, including expansion joints, flow elements, pipe, pumps, spent fuel pool heat exchangers (channel head), tubing, valves, filters, and mixing tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant amounts of corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group.

Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concluded that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, spent fuel pool heat exchangers (channel head) component types exposed to treated water (chemically treated borated water) using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to a later revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff concluded that the chemistry Control for primary systems program is acceptable for managing this aging effect.

However, for other stainless steel components exposed to treated water, the applicant considered them consistent with the GALL Report, since a different component type was referenced with a different program, identifying it in LRA Table Note E. During the site audit, the staff asked the applicant to provide the basis for considering some components with the same material, environment, and aging effect combination as consistent with the GALL Report, referencing LRA Table Note E, and others as not consistent with GALL Report, referencing LRA Table Note H. For example, in the LRA Table 3.2.2-5, page 3-138, the applicant stated that for a pipe component type exposed to treated water and subject to loss of material, this component, material and environment combination is not consistent with the GALL Report (i.e., LRA Table Note H). On the other hand, in LRA Table 3.2.2-5, page 3-140, the applicant stated that for tubing and valve component types exposed to treated water and subject to loss of material (same material, environment, and aging effect combination), this is consistent with the GALL Report Item VII.C2.2-a (i.e., LRA Table Note E). The applicant submitted an LRA supplement letter, dated July 7, 2004, and stated that the note should have been Note H for all of these component types, and references to the GALL Report item and Table 1 item should be removed from Table 2. The staff reviewed the applicant's response and concludes that it is acceptable.

All other AMRs assigned to the staff in Tables 3.2.2-1 through 3.2.2-5 were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the ESF systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the engineering safety features systems, as required by 10 CFR 54.21(d).

3.2B <u>Unit 3 Aging Management of Engineered Safety Features Systems</u>

This section of the SER documents the staff's review of the applicant's AMR results for the ESF systems components and component groups associated with the following systems:

- containment recirculation system
- quench spray system
- safety injection system
- residual heat removal system
- fuel pool cooling and purification system

3.2B.1 Summary of Technical Information in the Application

In LRA Section 3.2, the applicant provided AMR results for ESF systems components and component groups. In LRA Table 3.2.1, "Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the ESF systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.2B.2 Staff Evaluation

The staff reviewed LRA Section 3.2 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the ESF system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did confirm that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. The staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.2B.2.1 of this SER.

The staff also performed an audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. Te staff confirmed that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.2.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.2B.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not address in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluation are address in the MPS audit and review report and summarized in Section 3.2B.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.2B.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the ESF system components.

Table 3.2B-1 provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.2 that are addressed in the GALL Report.

Table 3.2B-1 Staff Evaluation for Engineered Safety Features System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Piping, fittings, and valves in emergency core cooling system (Item Number 3.2.1-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3B, Metal Fatigue
Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling system (Item Number 3.2.1-03)	Loss of material due to general corrosion	Plant-specific		Not applicable (See Section 3.2B.2.2.2)
Components in containment spray (PWR only), standby gas treatment (BWR only), and emergency core cooling systems (Item Number 3.2.1-05)	Loss of material due to pitting and crevice corrosion	Plant-specific	Chemistry control for primary systems program (B2.1.5); Work control process (B2.1.25); Tank inspection program (B2.1.24)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Containment isolation valves and associated piping (Item Number 3.2.1-06)	Loss of material due to MIC	Plant-specific	Chemistry control for primary systems program (B2.1.5); Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.4)
HPSI (charging) pump mini-flow orifice (Item Number 3.2.1-08)	Loss of material due to erosion	Plant-specific	Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.5)
External surface of carbon steel components (Item Number 3.2.1-10)	Loss of material due to general corrosion	Plant-specific	General condition monitoring (B2.1.13)	Consistent with GALL, which recommends further evaluation (See Section 3.2B.2.2.2)
Piping and fittings of CASS in emergency core cooling systems (Item Number 3.2.1-11)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	Inservice inspection program: systems, components and supports (B2.1.18)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1)
Components serviced by open-cycle cooling system (Item Number 3.2.1-12)	Loss of material due to general pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system		Not applicable, no further evaluation (there are no ESF components in open-cycle cooling water environments)
Components serviced by closed-cycle cooling system (Item Number 3.2.1-13)	Loss of material due to general pitting, and crevice corrosion	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1)
Pumps, valves, piping, and fittings, and tanks in containment spray and emergency core cooling systems (Item Number 3.2.1-15)	Crack initiation and growth due to SCC	Water chemistry	Chemistry control for primary systems program (B2.1.5); chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.2B.2.1)
Carbon steel components (Item Number 3.2.1-17)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3); General condition monitoring (B2.1.13)	Consistent with GALL (See Sections 3.2B.2.1.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Closure bolting in high-pressure or high-temperature systems (Item Number 3.2.1-18)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting Integrity (B2.1.26)	consistent with GALL (See Section 3.2B.2.1.2)

The staff's review of the Millstone ESF systems and associated components followed one of several approaches. One approach, documented in Section 3.2B.2.1, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.2B.2.2, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.2B.2.3, involves the staff's review of the AMR results for components in the ESF systems that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the ESF systems components is documented in Section 3.0.3 of this SER.

3.2B.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Sections 3.2.2.1.1 through 3.2.2.1.5 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the ESF systems components:

- boric acid corrosion
- chemistry control for primary systems program
- general condition monitoring
- service water system (open-cycle cooling)
- work control process
- buried pipe inspection program
- tank inspection program
- closed-cycle cooling water system
- inservice inspection program: systems, components and supports
- bolting integrity program

Staff Evaluation. In Tables 3.2.2-1 through 3.2.2-5 of the LRA, the applicant provided a summary of AMRs for the ESF systems and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report. The staff confirmed that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to confirm consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to confirm consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to confirm consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.2B.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of LRA Table 3.2.1, Item 3.2.1-17, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, “Boric Acid Corrosion Program,” and MPS AMP B2.1.13, “General Condition Monitoring Program.” The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program and general condition monitoring program are evaluated in Sections 3.0.3.1 and 3.0.3.3.2 of this SER, respectively.

The general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit, the staff asked the applicant for clarification regarding how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. During the audit clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. During the audit, the applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program in that the general condition monitoring program inspections identify borated water leakage and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

In the LRA, the applicant stated that for those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once every 10 years to confirm the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for these cubicles will probably be more frequent than once every 10 years due to the need to perform corrective maintenance, filter changeout, etc. The Unit 3 areas accessed at least once per refueling interval are typically observed by operations personnel during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. Based on the audit and review of the general condition monitoring program, the staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

3.2B.2.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In LRA Table 3.2.1, Item 3.2.1-18, the applicant stated that bolting in the ESF systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in ESF systems is not identified as an aging effect requiring management.

The staff noted that SRP-LR Table 3.2-1 recommended GALL AMP XI.M18, for managing closure bolting in high pressure or high temperature system for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.

During the audit, the staff questioned the applicant whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted its LRA supplement. in which it stated that it has developed a specific aging management program that addresses degradation of bolting at MPS. The program is addressed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of LRA Table 3.2.1, Item 18 with "consistent with the NUREG-1801."

The staff reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.2.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further staff review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.2.2.2 of the LRA, the applicant provided further evaluation of aging management as recommended by the GALL Report for ESF systems. Specifically, the applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general corrosion
- local loss of material due to pitting and crevice corrosion
- local loss of material due to microbiologically influenced corrosion
- local loss of material due to erosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.2.2.2 of the SRP-LR). Details of the staff's audit and review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.2B.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.2B.2.2.2 Loss of Material Due to General Corrosion

In LRA Section 3.2.2.2.2, the applicant addressed loss of material due to general corrosion that could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components.

SRP-LR Section 3.2.2.2.2 states that loss of material due to general corrosion could occur in the containment spray, containment isolation valves and associated piping, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that for loss of material from internal surfaces, this SRP-LR item applies to carbon steel containment spray headers, nozzles, and valves and to carbon steel containment isolation piping and valves. The containment spray headers, nozzles, and valves and containment isolation components in the ESF systems are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components associated with other plant systems are evaluated for the effects of aging along with the host system to which they are assigned.

For loss of material from external surfaces, this item applies to carbon steel ESF components. Loss of material from external surfaces due to general corrosion is applicable to carbon steel (including cast iron and low-alloy steel) components in an air environment when exposed to intermittent wetting conditions. For these components, loss of material from external surfaces is managed by MPS AMP B2.1.13, "General Condition Monitoring Program."

The staff finds that loss of materials due to general corrosion does not apply to stainless steel components.

The staff reviewed the general condition monitoring program, and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

On the basis of its review of the general condition monitoring program, the staff finds that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion, as recommended in the GALL Report.

3.2B.2.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion

In LRA Section 3.2.2.2.3, the applicant addressed local loss of material from pitting and crevice corrosion that could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the RWST external surfaces.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material from pitting and crevice corrosion could occur in the containment spray components, containment isolation valves and associated piping, and the buried portion of the refueling water tank external surface. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

In the LRA, the applicant stated that containment isolation components are potentially subject to loss of material due to pitting and crevice corrosion. Loss of material for these components is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” or, for those components in a raw water environment, by MPS AMP B2.1.25, “Work Control Process.”

Also, the external bottom surface of the RWST is potentially subject to loss of material due to pitting and crevice corrosion. Loss of material of the external surface of the RWST bottom is managed by MPS AMP B2.1.24, “Tank Inspection Program.”

The applicant stated, in the LRA, that the chemistry control for primary systems program is consistent with GALL with an exception. The staff reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program acceptable for managing this aging effect for the above components.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for managing the aging effect of loss of materials.

The staff reviewed the tank inspection program, which includes an enhancement to measure wall thickness to detect significant loss of material of the RWST bottom surface, and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds the program to be acceptable for managing loss of material due to pitting and crevice corrosion.

3.2B.2.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion

In LRA Section 3.2.2.2.4, the applicant addressed local loss of material due to MIC.

SRP-LR Section 3.2.2.2.4 states that local loss of material due to MIC could occur in containment isolation valves and associated piping in systems that are not addressed in other chapters of the GALL Report. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that containment isolation components are potentially subject to loss of material due to MIC. Loss of material for these components is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” or, for those components in a raw water environment, by MPS AMP B2.1.25, “Work Control Process.”

The applicant stated, in the LRA, that the chemistry control for primary systems program is consistent with GALL with an exception. The staff reviewed the chemistry control for primary systems program, with the exception, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program to be acceptable for managing this aging effect for the above components.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for managing the aging effect of loss of materials.

3.2B.2.2.5 Local Loss of Material Due to Erosion

In LRA Section 3.2.2.2.6, the applicant addressed local loss of material due to erosion that could occur in the HPSI miniflow orifice.

SRP-LR Section 3.2.2.2.6 states that local loss of material due to erosion could occur in the HPSI pump miniflow orifice. This aging mechanism and its effect will apply only to pumps that are normally used as charging pumps in the chemical and volume control systems. The GALL Report recommends further evaluation to ensure that the aging effect is adequately managed.

The applicant stated, in the LRA, that loss of material due to erosion of the charging pump miniflow recirculation orifices is managed by MPS AMP B2.1.25, “Work Control Process.”

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for managing the aging effects of loss of material due to erosion, as recommended in the GALL Report.

3.2B.2.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff’s evaluation of the applicant’s Quality Assurance Program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3 AMR Results That are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.2.2-1 through 3.2.2-5 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The staff also reviewed additional systems and components, provided in the applicant's letter dated January 11, 2005.

In Tables 3.2.2-1 through 3.2.2-5, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation.

3.2B.2.3.1 Containment Recirculation - Aging Management Evaluation - Table 3.2.2-1

The staff reviewed Table 3.2.2-1 of the LRA, which summarizes the results of AMR evaluations for the containment recirculation component groups.

The applicant has not identified in the LRA any aging effects for low-alloy and stainless steel components exposed to air, including bolting, expansion joints, flow elements, flow indicators, hoses, pipe, pump seal coolers, pump seal head tanks, pumps, restricting orifices, spray nozzles, TSP baskets, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on low-alloy and stainless steel components will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steels are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel flow indicators, hoses, piping, tubing, and valve component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The staff reviewed the chemistry control for primary systems program, with an exception, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

In the LRA, the applicant proposed to manage loss of material of stainless steel containment recirculation coolers (shell) component types exposed to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, "General Condition Monitoring." This is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy containment recirculation coolers (tubes) component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process." This is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on external surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of stainless steel containment recirculation coolers (shell), expansion joints, flow elements, pipe, and restricting orifices component types exposed internally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process." This is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal and external surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy containment recirculation coolers (tubes) component types exposed internally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," with exceptions. The applicant stated, in the LRA, that the tube side and the shell side of the containment recirculation coolers are in dry lay-up except when testing. The applicant's exception to this line item relates to flushing and testing "infrequently used cooling loops," which is recommended in the GALL Report. Since these coolers are maintained in a dry lay-up condition, no mechanism exists for tube-side fouling. This does not have any impact on loss of material. In addition, the applicant stated that this program is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System," which includes routine inspection and a maintenance program to ensure that corrosion cannot degrade the performance of safety-related systems serviced by open-cycle cooling water. The staff reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 3.0.3.2.15 of this SER. On the basis of its review, the staff finds that this program is acceptable for managing this aging effect.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe, pump, and valve component types exposed internally to raw water using MPS AMP B2.1.25, "Work Control Process." The applicant stated, as documented in the technical report for the work control process, that the system drains going into the containment sump are assumed to contain raw water because of the potential contaminants and lack of chemistry control. The staff noted that this is different from the raw water used in open-cycle cooling systems. The applicant stated per Note H that the aging effect is not in NUREG-1801 for this component, material, and environment combination. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

LRA Table 3.2.2-1 for the containment recirculation components identify loss of material as an aging affect applicable to nickel based alloys and copper alloys exposed to internal and external air environments. The LRA does not identify the alloy zinc content for these materials. The LRA credits the work control process for managing loss of material of the nickel based alloy containment recirculation cooler tubesheets and copper alloy tubes in an external air environment and the AMP "Service Water System" for managing loss of material on the interior of copper alloy channel heads and tubes and nickel based alloy tubesheets. Industry documents such as EPRI Report 1003056 identify various corrosion mechanisms causing loss of material in an air environment subject to moisture. Aging mechanisms such as selective leaching, crevice corrosion and galvanic corrosion are material and location dependent. In RAI 3.2-1 the applicant was requested to identify the alloy zinc content and clarify if selective leaching is an applicable aging mechanism. If selective leaching is an applicable aging mechanism, clarify if hardness testing and one-time inspection required by GALL AMP XI.M33 will be used. Also clarify how visual inspections required by the aging management programs are effective in managing loss of material by providing for inspections at locations that are susceptible to the aging mechanism such as the [the] tubesheet and channel head interiors which may be inaccessible for visual inspection. The applicant was also requested to provide the following additional information (a) frequency of the inspections including the bases. (b) Inspection methods which verify the loss of material in the recirculation cooler channel heads, tube sheets and tubes (c) Identify any operating experience to demonstrate the effectiveness of the work control process and the service water program to manage loss of material in nickel based alloys and copper alloys exposed to an external air environment.

In its response dated November 9, 2004, the applicant stated:

> The containment recirculation cooler tubes and channel head lining are copper-nickel material and the tubesheet is nickel-copper (Monel) material. Zinc is not an alloying element for any of these materials. Therefore, selective leaching is not an applicable aging mechanism for these components.
>
> The containment recirculation coolers are maintained in a dry lay-up condition and loss of material due to corrosion is not expected. However, since the coolers are flushed and flow tested on a periodic basis, the aging management review conservatively considered the environment for the coolers to be intermittently wetted. As a result, loss of material due to corrosion was determined to be an applicable aging effect for the containment recirculation coolers. The coolers are accessed and the tubesheets and channel head interiors are inspected as part of the Service Water System (Open-Cycle Cooling AMP described in LRA Appendix B, Section B2.1.21. In addition, components that are opened or disassembled for maintenance activities are visually inspected as part of the Work Control Process aging management program as described in Appendix B, Section B2.1.25. For containment recirculation cooler locations that are not readily accessible for visual inspection, the Work Control Process AMP remains effective in that other work activities which are associated with components representative of the specific materials and environments of the coolers provided an indication of the condition of the cooler components.
>
> The containment recirculation coolers are inspected every other refueling outage in accordance with the Service Water System (Open-Cycle Cooling) AMP. The containment recirculation cooler inlet ends are accessed and a visual inspection is performed.
>
> Demonstration of the effectiveness of the Service Water System (Open-Cycle Cooling) AMP is addressed in the discussion of operating experience provided in the LRA Section B2.1.21. Operating experience related to the Work Control Process AMP is addressed in LRA Section B2.1.25.

The staff finds the applicant’s response reasonable and acceptable because the applicant has clarified why selective leaching is not an applicable aging mechanism for these components. The applicant has also identified inspection activities to appropriately manage the aging effects.

The applicant stated in the LRA “The Millstone Unit 3 containment recirculation coolers and service water supply piping to these heat exchangers are infrequently used loops but are not flushed in accordance with GL 89-13. The containment recirculation coolers are maintained in a dry lay up condition. Thus, no mechanism exist for tube side fouling and the ability of the coolers to perform their intended function is maintained. The service water supply piping to these heat exchangers is flushed on a semi-annual basis to displace any mussel or hydroid colonies onto screens installed on the tubesheets of these heat exchangers. The accumulated debris on the screens is then removed after the flushing evolution. In RAI 3.2-2 the applicant was requested to provide information based on inspections and applicant’s self-assessment programs which assure that with the present state of fouling the recirculation coolers in Unit 3 will be able to perform to their intended function during the period of extended operation. For example are visual inspections performed and correlated to an acceptable degree of fouling to determine the effectiveness of the dry lay up program?

In its response dated November 9, 2004, the applicant stated:

> Review of the last three years of inspection data for the Unit 3 A, B, C and D containment recirculation coolers and discussion with the system engineer indicate that the degree of fouling is minor and did not affect the operability of the heat exchangers. The semi-annual service water inlet piping flush and inspection did not identify foreign debris in most cases. Some inspections did identify small amounts of mussel shell pieces and evaluations in accordance with plant procedures were performed to determine if the heat exchanger operation could have been impacted; however, no concerns were identified. Based on the results of the current flushing and inspection frequency, the dry lay up program is effective in maintaining the degree of fouling at a level that supports plant operation. Any substantial change in the effectiveness of the flush and inspection surveillance results would be addressed through the corrective action program.

The staff finds the applicant's response reasonable and satisfactory because the applicant's operating experience and piping flush and inspection activities indicate that the operability of the heat exchangers is not affected.

3.2B.2.3.2 Quench Spray - Aging Management Evaluation - Table 3.2.2-2 and Table 3.2.2-2a

The staff reviewed Table 3.2.2-2 of the LRA and Table 3.2.2-2a in the applicant's letter dated January 11, 2005, which summarized the results of AMR evaluations for the quench spray system component groups.

The applicant, in the LRA, has identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, flow elements, pipe, pumps, spray nozzles, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, therefore, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concurs with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel flow elements, pipe, pump, tubing, and valve component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The staff reviewed the chemistry control for primary systems program, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff finds this program to be acceptable for managing the aging effects for the above components.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, “Buried Piping Inspection Program.” The applicant stated that this program is consistent with GALL AMP XI.M28, “Buried Piping and Tanks Surveillance,” and GALL AMP XI.M34, “Buried Piping and Tanks Inspection,” with exceptions and enhancements. The staff reviewed the Buried Piping Inspection Program, with the exceptions and enhancements, and its evaluation is documented in Section 3.0.3.2.1 of this SER. The staff finds that this program includes a baseline inspection of a representative sample of piping with different protective measures and inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the staff finds that the program is acceptable for managing loss of material of stainless steel pipe in a damp soil external environment.

In the LRA and the LRA supplement letter dated January 11, 2005, the applicant proposed to manage (1) loss of material of stainless steel restricting orifice component types exposed externally to a moisture-laden air and/or intermittently wetted environment and (2) loss of loss of material of stainless steel refueling water coolers (channel head) using MPS AMP B2.1.13, “General Condition Monitoring.” This is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

3.2B.2.3.3 Safety Injection - Aging Management Evaluation - Table 3.2.2-3 and Table 3.2.2-3a

The staff reviewed Table 3.2.2-3 of the LRA and Table 3.2.2-3a in the applicant’s letter dated January 11, 2005, which summarized the results of AMR evaluations for the safety injection (SI) system component groups.

The applicant, in the LRA and in the applicant’s letter dated January 11, 2005, identified no aging effect for carbon steel, cast iron, stainless steel, and CASS components exposed to air, including filters/strainers, flow elements, pipe, pumps, restricting orifices, SI accumulator tanks (carbon steel with stainless steel cladding), SI pump lube oil coolers (shell), SI pump lube oil reservoirs, tubing, valve, and hydro test pump component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel and CASS are not susceptible to significant general corrosion that would affect the intended function of components. The staff finds that it did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, "Buried Piping Inspection Program." The applicant stated that this program is consistent with GALL AMP XI.M28, "Buried Piping and Tanks Surveillance," and GALL AMP XI.M34, "Buried Piping and Tanks Inspection," with exceptions and enhancements. The staff reviewed the Buried Piping and Tanks Inspection, with the exceptions and enhancements, and its evaluation is documented in Section 3.0.3.2.1 of this SER. The staff finds that this program includes a baseline inspection of a representative sample of piping with different protective measures and inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of stainless steel pipe exposed externally to a damp soil environment.

The applicant, in the LRA, has identified no aging effect for carbon and stainless steel components exposed internally to gas, including pipe, SI accumulator tanks (carbon steel with stainless steel cladding), and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concurs with the applicant's conclusion that there are no applicable aging effects requiring management for metal in a gas environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel SI pump lube oil coolers (channel head) component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring." This is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of carbon steel, cast iron, and stainless steel filter/strainer, SI pump lube oil coolers (shell), SI pump lube oil coolers (tubes), SI pump lube oil coolers (tube sheet), and SI pump lube oil reservoirs component types exposed internally to oil, and in some cases externally to oil, using MPS AMP B2.1.25, "Work Control Process." The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of internal surfaces of components are performed during the performance of maintenance to determine the presence of loss of material. Oil samples are analyzed periodically for contaminants that would indicate degradation. On the basis of its review, the staff finds that the program is acceptable for managing loss of materials for the above components.

In the LRA, the applicant proposed to manage loss of materials of copper alloy SI pump lube oil coolers (tubes) component types in an environment of treated closed-cycle cooling water using MPS AMP B2.1.7, "Closed-Cycle Cooling Water System." The Closed-Cycle Cooling Water (CCCW) system program is consistent with GALL AMP XI.M21, "Closed-Cycle Cooling Water Systems," with an exception. The staff reviewed the CCCW system program, with the exception, and its evaluation is documented in Section 3.0.3.2.4 of this SER. On the basis of its review, the staff finds that this program, with the exception, is acceptable for managing loss of material of components in the treated water environment that are serviced by the CCCW system.

3.2B.2.3.4 Residual Heat Removal - Aging Management Evaluation - Table 3.2.2-4

The staff reviewed Table 3.2.2-4 of the LRA, which summarizes the results of AMR evaluations in the SRP-LR for the residual heat removal system component groups.

The applicant, in the LRA, identified no aging effect for carbon steel, stainless steel, and CASS components exposed to air, including flow elements, pipe, pumps, residual heat removal (RHR) heat exchangers (channel head), tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in an ambient air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concurs with the applicant's conclusion that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel residual heat removal heat exchanger (tubes) component types exposed internally to treated water using MPS AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.2B.2.3.5 Fuel Pool Cooling and Purification - Table 3.2.2-5 and Table 3.2.2-5a

The staff reviewed Table 3.2.2-5 of the LRA and Table 3.2.2-5a in the applicant’s letter dated January 11, 2005, which summarized the results of AMR evaluations for the fuel pool cooling and purification system component groups.

The applicant, in the LRA and the applicant’s supplement dated January 11, 2005, identified no aging effect for low-alloy and stainless steel components exposed to air, including bolting, flow elements, fuel pool coolers (channel head), pipe, pumps, tubing, valve, fuel pool demineralizer, fuel pool post filter, and strainers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Therefore, the staff concurred with the applicant's conclusion that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel flow elements and fuel pool coolers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program," which is consistent with GALL AMP XI.M2, "Water Chemistry," with an exception. The staff reviewed the Chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to confirm the absence of loss of material is not required. On the basis of its review, the staff finds this program to be acceptable for managing the aging effects for the above components.

All other AMRs in Tables 3.2.2-1 through 3.2.2-5 were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report or not addressed in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the ESF systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the engineering safety features systems, as required by 10 CFR 54.21(d).

3.3 Aging Management of Auxiliary Systems

3.3A Unit 2 Aging Management of Auxiliary Systems

This section of the SER documents the staff's review of the applicant's AMR results for the Unit 2 auxiliary systems components and component groups associated with the following systems:

- circulating water system
- screen wash system
- service water system
- sodium hypochlorite system
- reactor building closed cooling water system

- chilled water system
- instrument air system
- nitrogen system
- station air system
- chemical and volume control system
- sampling system
- primary makeup water system
- access control area air conditioning system
- main condensers evacuation system
- containment air recirculation and cooling system
- containment and enclosure building purge system
- containment penetration cooling system
- containment post-accident hydrogen control system
- control room air conditioning system
- control element drive mechanism cooling system
- diesel generator ventilation system
- engineered safety features (ESF) room air recirculation system
- enclosure building filtration system
- fuel handling area ventilation system
- main exhaust ventilation system
- non-radioactive area ventilation system
- process and area radiation monitoring system
- radwaste area ventilation system
- turbine building ventilation system
- vital switchgear ventilation system
- Unit 2 fire protection system
- Unit 3 fire protection system
- domestic water system
- diesel generator system
- diesel generator fuel oil system
- station blackout (SBO) diesel generator system
- security system
- clean liquid waste processing system
- gaseous waste processing system
- post-accident sampling system
- station sumps and drains system
- turbine building closed cooling water system

3.3A.1 Summary of Technical Information in the Application

In LRA Section 3.3, the applicant provided AMR results for auxiliary systems components and component groups. In LRA Table 3.3.1, "Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems," the applicant provided a summary comparison of its aging management reviews (AMRs) with the AMRs evaluated in the Generic Aging Lessons Learned (GALL) report for the auxiliary systems components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of aging effects requiring management (AERMs). These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.3A.2 Staff Evaluation

The staff reviewed LRA Section 3.3 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the auxiliary system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL aging management programs (AMPs). The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Detail of the staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.3A.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.3.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.3A.2.2 of this SER.

The staff performed an onsite audit conducted a technical review of the remaining AMRs that were not consistent with or not addressed in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.3A.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.3A.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the auxiliary system components.

Table 3.3A-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.3 that are addressed in the GALL Report.

Table 3.3A-1 Staff Evaluation for Auxiliary System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in spent fuel pool cooling and cleanup	Loss of material due to general, pitting, and crevice	Water chemistry and one time inspection		Not applicable (See Section 3.3A.2.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Linings in spent fuel cooling and cleanup system; seals and collars in ventilation systems (Item Number 3.3.1-02)	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant-specific	Work control process (B2.1.25); General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.3A.2.2.2)
Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR) (Item Number 3.3.1-03)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 52.21(c)	TLAA	This TLAA is evaluated in Section 4.3A, Metal Fatigue
Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR) (Item Number 3.3.1-04)	Crack initiation and growth due to SCC or cracking	Plant-specific		Consistent with GALL (See Section 3.3A.2.2.4)
Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components (Item Number 3.3.1-05)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant-specific	General condition monitoring (B2.1.13); Fire protection program (B2.1.10); Work control process (B2.1.25); Tank inspection program (B2.1.24); Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.5)
Components in reactor coolant pump oil collection system of fire protection (Item Number 3.3.1-06)	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	Tank inspection program (B2.1.24); Work control process (B2.1.25)	Consistent with GALL (See Section 3.3A.2.2.6)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system (Item Number 3.3.1-07)	Loss material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Fuel oil chemistry program (B2.1.12), Work control process (B2.1.25), Tank inspection program (B2.1.24)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.7)
Heat exchangers in chemical and volume control system (Item Number 3.3.1-09)	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and plant-specific verification program	Chemistry control for primary systems program (B2.1.5), Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.9)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1-10)	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant-specific		Not applicable (See Section 3.3A.2.2.10)
New fuel rack assembly (Item Number 3.3.1-11)	Loss of material due to general, pitting and, crevice corrosion	Structures monitoring		Not consistent with GALL (See Section 3.5A.2.3.4) The new fuel rack assembly is fabricated from stainless steel. No aging effect management is required for the stainless steel fuel rack assembly.
Neutron absorbing sheets in spent fuel racks (Item Number 3.3.1-12)	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring	Boraflex monitoring (B2.1.2)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Spent fuel storage racks and valves in spent fuel pool cooling and cleanup (Item Number 3.3.1-13)	Crack initiation and growth due to stress corrosion cracking	Water chemistry		Not consistent with GALL. The spent fuel pool water temperature is maintained below the threshold temperature of 140 degree F for SCC.
Closure bolting and external surfaces of carbon steel and low-alloy steel components (Item Number 3.3.1-14)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.2); General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.3A.2.1.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in or serviced by closed-cycle cooling water system (Item Number 3.3.1-15)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7); Work control process (B2.1.25); Chemistry control for primary systems program (B2.1.5); Chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Cranes, including bridge and trolleys, and rail system in load handling system (Item Number 3.3.1-16)	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	Inspection activities: load handling cranes and devices (B2.1.19)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Components in or serviced by open-cycle cooling water systems (Item Number 3.3.1-17)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and boifouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Service water system (open-cycle cooling) (B2.1.19); Work control process (B2.1.25); Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1.3)
Buried piping and fittings (Item Number 3.3.1-18)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tank surveillance or Buried piping and tanks inspection	Buried piping inspection (B2.1.4)	Consistent with GALL, which recommends further evaluation (See Section 3.3A.2.2.11)
Components in compressed air system (Item Number 3.3.1-19)	Loss of material due to general and pitting corrosion	Compressed air monitoring	Work control process (B2.1.25)	Consistent with GALL (See Section 3.3A.2.1)
Components (doors and barrier penetration seals) in concrete structures in fire protection (Item Number 3.3.1-20)	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	Fire protection program (B2.1.10); Work control process (B2.1.25)	Consistent with GALL (See Section 3.3A.2.1.4)
Components in water-based fire protection (Item Number 3.3.1-21)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	Fire protection program (B2.1.10); Work control process (B2.1.25) ; Tank inspection program (B2.1.24)	Consistent with GALL (See Section 3.3A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in diesel fire system (Item Number 3.3.1-22)	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	Fuel oil chemistry (B2.1.12)	Consistent with GALL (See Section 3.3A.2.1)
Tanks in diesel fuel oil system (Item Number 3.3.1-23)	Loss of material due to general, pitting, and crevice corrosion	Above ground carbon steel tanks	Tank inspection program (B2.1.24)	Consistent with GALL, which recommends no further evaluation (See Section 3.3A.2.1)
Closure bolting (Item Number 3.3.1-24)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	Bolting integrity	Consistent with GALL (See Section 3.3A.2.1)
Components (aluminum, bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink (Item Number 3.3.1-29)	Loss of material due to selective leaching	Selective leaching of materials	Work control process (B2.1.25); Buried piping inspection (B2.1.4)	Consistent with GALL (See Section 3.3A.2.1.5)
Fire barriers, walls, ceilings, and floors in fire protection (Item Number 3.3.1-30)	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring		Not consistent with GALL (See Section 3.5A.2.3.26)

The staff's review of the MPS auxiliary systems and associated components followed one of several approaches. One approach, documented in Section 3.3A.2.1, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.3A.2.2, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.3A.2.3, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the auxiliary systems components is documented in Section 3.0.3 of this SER.

3.3A.2.1 AMR Results That are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Sections 3.3.2.1.1 through 3.3.2.1.41 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the auxiliary systems components:

- general condition monitoring program
- work control process program
- boric acid corrosion program
- buried pipe inspection program
- infrequently accessed areas inspection program
- service water system (open-cycle cooling) program
- closed-cycle cooling water system program
- chemistry control for primary systems program
- chemistry control for secondary systems program
- inservice inspection program: systems, components and supports program
- fire protection program
- tank inspection program
- fuel oil chemistry program
- bolting integrity program

Staff Evaluation. In Tables 3.3.2-1 through 3.3.2-41 of the LRA, the applicant provided a summary of AMRs for the auxiliary systems components and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.3A.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of LRA Table 3.3.1, Item 3.3.1-14, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, “ Boric Acid Corrosion Program;” and MPS AMP B2.1.13, “General Condition Monitoring Program.” The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program is evaluated in Section 3 of this SER.

In the LRA, the applicant stated that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit, the staff asked the applicant for clarification on how loss of material for components not normally visible, or in infrequently accessed areas are managed by this program. During the audit, further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. During the audit, the applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program in that the general condition monitoring program identifies borated water leakage during inspections and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. No infrequently accessed areas with systems containing borated water are identified by the applicant.

The staff's evaluation of the general condition monitoring program is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks.

3.3A.2.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

In LRA Table 3.3.2-30 (page 3-274), the applicant listed both MPS AMP B2.1.25, "Work Control Process," and MPS AMP B.2.1.7, "Closed Water Cooling Systems," for loss of material exposed internally to treated water for the DC switchgear cooling coils. During the audit and review, the applicant was asked to clarify which AMP is credited. In LRA supplement dated July 7, 2004, the applicant stated that AMP B2.1.25, "Work Control Process," was inadvertently listed as an AMP for managing loss of material in treated water environment for the DC switchgear air conditioning unit cooling coils component group. The staff reviewed the applicant's response and based on the clarification provided, finds it acceptable.

3.3A.2.1.3 Loss of Material Due to General, Pitting, and Galvanic Corrosion, MIC, and Biofouling; Buildup of Deposit Due to Biofouling

In the discussion section of LRA Table 3.3.1, Item 3.3.1-17 (page 3-195), the applicant stated that loss of material for components in an open-cycle cooling water environment is managed by AMP B2.1.21, "Service Water System (Open-Cycle Cooling) Program." However, Item 3.3.1-17 does not address buildup of deposits as an aging effect managed by the service water system (open-cycle cooling) program for the heat exchanger tubes and lined piping in a seawater environment. In an LRA supplement dated July 7, 2004, the applicant stated that in LRA Table 3.3.1, Item 3.3.1-17, the first sentence in the discussion should include "and Buildup of Deposits" after "Loss of Material." The staff reviewed the applicant's response and finds it acceptable.

3.3A.2.1.4 Loss of Material Due to Wear, Hardening and Shrinkage

In the discussion section of LRA Table 3.3.1, Item 3.3.1-20, the applicant stated that loss of material due to wear is not an applicable aging effect for components (doors and barrier penetration seals) in the fire protection system. Fire doors could see wear on hinges, locks, etc., due to periodic opening and closing. This could cause loss of material and impact on the intended function of fire doors. During the audit and review, the staff asked the applicant to provide justification as to why this aging effect was not included. The applicant stated that fire doors are passive features to seal passageways through fire-rated barriers. Fire doors are equipped with hardware and attachment/closure devices that perform their intended function with moving parts and/or change of configuration and are considered to be active components. As such, wear of the hardware, appurtenances, and attachment/closure mechanisms is not considered to be an aging effect, but rather a consequence of frequent or rough usage. The applicant restated that the conclusions in the LRA remain valid and unchanged. However, the applicant initiated revisions to the technical report for miscellaneous structural commodities to incorporate the above evaluation for wear of the hinges and locks for the fire doors. Based on the fact that these components are active components, the staff finds the response acceptable.

3.3A.2.1.5 Loss of Material Due to Selective Leaching

In the discussion section of LRA Table 3.3.1, Item 3.3.1-29, the applicant stated that loss of material due to selective leaching is managed using MPS AMP B2.1.25, “Work Control Process,” and MPS AMP B2.1.4, “Buried Pipe Inspection Program.” The applicant stated that these two programs are not consistent with GALL AMP XI.M33, “Selective Leaching,” in that the GALL program recommends a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function for the period of extended operation. However, the work control process program and the buried pipe inspection program perform only routine visual inspection (which is more than a one-time inspection) when the opportunity arises, but do not perform hardness testing.

Since selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection alone, the staff asked the applicant to justify the use of visual inspection only, or provide other means of detection (Brinnell hardness, destructive testing) or other mechanical means (scraping, chipping, etc.). The staff’s evaluation of the applicant’s response is documented in the evaluation of the work control process program and the buried pipe inspection program in Sections 3.0.3.3.4 and 3.0.3.2.1 of this SER, respectively.

In the AMP technical report for the work control process program, the applicant stated that selective leaching is an aging mechanism that causes an aging effect of change in material properties. However, in the technical report of AMR results for the closed water system, the applicant stated that selective leaching is an aging mechanism under the aging effect of loss of material. The technical report for material aging effects considers selective leaching under loss of material. The staff noted there is a discrepancy as to how selective leaching is considered between the AMP and the AMR technical reports.

During the audit and review, the applicant was requested by the staff to provide a rationale for considering selective leaching as causing change in material properties, which is generally an aging effect associated with non-metallic, elastomer type materials. The applicant concurred that all technical reports should have associated selective leaching with the aging effect of loss of material. The staff reviewed the change document to the affected technical reports, which identified the change to include selective leaching under the “loss of material” aging effect. On the basis of its review, the staff finds this acceptable.

In an LRA supplement dated July 7, 2004, the applicant stated that LRA Table 3.3.2-32 (pages 3-286 through 3-297) should state, “3.3.1-29" for the second 'Table 1 Item' listed for components with cast iron/raw water and copper alloy/raw water material/environment combinations. The 'NUREG-1801 Volume 2 Item' column for the affected component groups should be “VII.C1.2-a” except for the 'Pipe' and 'Tubing' component groups, which should be “VII.C1.1-a.” The staff reviewed the applicant’s response and finds that it is acceptable.

In LRA Table 3.3.2-41(page 3-333), for the station sumps and drains system, and for loss of material of cast iron pumps and copper alloy valve components in a raw water environment, the applicant referenced LRA Table 3.3.1, Item 3.3.1-17. Item 3.3.1-17 only addressed loss of material due to miscellaneous corrosion, but not selective leaching. During the audit and review, the applicant was requested to provide a rationale for not considering loss of material due to selective leaching. In an LRA supplement dated July 7, 2004, the applicant stated that Unit 2 LRA Table 3.3.2-41 should contain additional information for the component groups 'pumps' (cast iron/raw water) and 'valves' (copper alloy/raw water). Specifically, each component group should have an additional entry for the 'Aging Management Program,' 'NUREG-1801 Volume 2 Item,' 'Table 1 Item,' and 'Notes' columns which adds the entries "Work Control Process,” “VII.C1.5-a” for pumps and “VII.C1.2-a” for valves, “3.3.1-29,” and “E,” respectively. Because the applicant concurred that LRA Table 3.3.1, Item 3.3.1-29 is applicable, the staff finds the response acceptable.

During the audit and review, the staff questioned why various portions of the fire protection system and diesel generator system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement letter dated July 7, 2004, the applicant added several components in the fire protection system and diesel generator system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system and diesel generator system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system and diesel generator system is documented in Section 2.3A.3.32 and Section 2.3A.3.34, respectively, of this SER.

3.3A.2.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and Stress Corrosion Cracking

In the discussion section of LRA Table 3.3.1, Item 3.3.1-24, the applicant stated that closure bolting in the auxiliary systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in auxiliary systems is not identified as an AERM.

During the review, the staff noted that SRP-LR Table 3.3-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.

The staff questioned the applicant whether all of the resolutions of the generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is reviewed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the “Discussion” column of LRA Table 3.3.1, Item 24 with “consistent with NUREG-1801."

The staff reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report.

Staff RAIs Pertaining to Recent Operating Experience and Emerging Issues. Because the GALL Report and SRP-LR were issued in July 2001, these documents do not reflect the most current recommendations for managing certain aging effects that have been the subject of recent operating experience or the topic of an emerging issue. As a result, the staff determined that additional information was required related to the boric acid corrosion. The applicant's responses and the staff evaluation of the responses are described below.

The LRA identifies a borated water leakage environment for various mechanical components in auxiliary systems. Both the boric acid corrosion program and general condition monitoring program are credited with managing loss of material from external surfaces of these components. The LRA states that the general condition monitoring program is performed in accessible plant areas. The applicant was requested to clarify how loss of material is managed for auxiliary system components not normally visible, such as under insulation or in normally inaccessible areas. In addition, the LRA states that the boric acid corrosion program is consistent with GALL AMP XI.M10. The scope of GALL AMP XI.M10 is limited to components in the vicinity of the reactor coolant pressure boundary. However, it appears that the MPS boric acid corrosion program is credited with managing loss of material caused by borated water leakage in systems that may not be in the vicinity of the reactor coolant pressure boundary, such as the radwaste area ventilation system. The applicant was requested to clarify this potential discrepancy. If the scope of the Millstone Units 2 and 3 boric acid corrosion program is different from the GALL XI.M10 program, the applicant was requested to revise the Millstone Units 2 and 3 program description accordingly in the AMP and FSAR supplement. Also the applicant was requested in RAI 3.3-A-1 to identify the basis for applying the boric acid corrosion program to manage boric acid corrosion in copper alloy and cast iron materials that are not addressed in GALL AMP XI.M10 and may require a different inspection frequency.

In a response dated December 3, 2004, the applicant clarified that general equipment (or materials) inspections are performed as often as daily. The applicant indicated that an independent assessment was performed by the Institute of Nuclear Power Operations (INPO) in August 2003 and boric acid leaks are captured in the station corrective action program. INPO noted that the computer based training module has increased awareness of station employees with regard to boric acid corrosion and minor program enhancements are being addressed through the corrective action program.

The applicant stated that the following clarification will be added to Section A2.1.3, Boric Acid Corrosion Program, of the LRA:

> The Boric Acid Corrosion program provides both detection and analysis of leakage of borated water inside containment. The General Condition Monitoring program is the primary method for detecting borated water leakage outside containment. The analysis of the leakage is performed through the boric acid corrosion program. Any necessary corrective actions are implemented through the corrective action program.

The staff reviewed the applicant's response and determined that the response was reasonable and acceptable because the applicant credits a combination of the general condition monitoring program and the boric acid corrosion program to detect and evaluate borated water leakage and boric acid corrosion to maintain the intended function of the auxiliary system components. For areas outside containment, general equipment (or materials) inspections are performed frequently. The inspections would be expected to identify any borated water leakage and any required subsequent evaluation. The applicant has agreed to include a clarification in the FSAR supplement to indicate that the general condition monitoring program is the primary method for detecting borated water leakage outside containment and the analysis of the leakage is performed through the boric acid corrosion program with corrective actions implemented through the corrective action program.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.3.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further project team review is required.

The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In LRA Section 3.3.2.2, the applicant provides further evaluation of aging management as recommended by the GALL Report for auxiliary systems. The applicant provided information concerning how it will manage the following aging effects:

- loss of material due to general, pitting, and crevice corrosion
- hardening and cracking or loss of strength due to elastomer degradation or loss of material due to wear
- cumulative fatigue damage
- crack initiation and growth due to cracking or stress corrosion cracking
- loss of material due to general, microbiologically influenced, pitting, and crevice corrosion
- loss of material due to general, galvanic, pitting, and crevice corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion and biofouling
- quality assurance for aging management of non-safety-related components
- crack initiation and growth due to stress corrosion cracking and cyclic loading
- reduction of neutron-absorbing capacity and loss of material due to general corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in Section 3.3.3.2 of the SRP-LR. Details of the staff's audit and review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections:

3.3A.2.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion

The staff reviewed LRA Section 3.3.2.2.1 against the criteria in SRP-LR Section 3.3.2.2.1. In LRA Section 3.3.2.2.1, the applicant addressed loss of material in components of the spent fuel pool system.

SRP-LR Section 3.3.2.2.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tube sheets of the heat exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from general, pitting, or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the water chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of selected components at susceptible locations is an acceptable method for ensuring that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Further, SRP-LR Section 3.3.2.2.1 states that loss of material due to pitting and crevice corrosion could occur in the filter housing, valve bodies, and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program.

The AMP recommended by the GALL Report is GALL AMP XI.M2, "Water Chemistry," for management of loss of material due to general, pitting, and crevice corrosion.

The applicant stated in the LRA that as set forth in the GALL Report, this item applies to spent fuel pool cooling and cleanup carbon steel components with elastomer linings. The spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant included the spent fuel pool cooling system in Unit 2 LRA Section 3.2, "Engineered Safety Features Systems." The staff reviewed the LRA Table 3.2.2-5 AMR for the spent fuel pool cooling system and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the staff finds this line item not applicable for components in the spent fuel pool cooling system.

However, these components are fabricated from stainless steel material. As stated in Section 3.2A.2.3.5 of this SER, the applicant proposed to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, and spent fuel pool heat exchangers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception related to use of a later, non-NRC-approved revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the staff finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

3.3A.2.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear

The staff reviewed LRA Section 3.3.2.2.2 against the criteria in SRP-LR Section 3.3.2.2.2. In LRA Section 3.3.2.2.2, the applicant addressed the potential for degradation of elastomers in collars and seals in spent fuel pool cooling system and ventilation systems.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating and ventilation systems, and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA that the spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant has included the spent fuel pool cooling system in LRA Section 3.2, “Engineered Safety Features Systems.” The staff reviewed the Table 3.2.2-5 AMR for spent fuel pool cooling system and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the staff finds that this line item is not applicable for components in spent fuel pool cooling system.

The applicant stated in the LRA that elastomers are used in ventilation systems components and are evaluated for cracking and change of material properties due to thermal and radiation exposure. The applicant credited AMP B2.1.25, “Work Control Process,” and AMP B2.1.13, “General Condition Monitoring Program,” for managing age-related degradation of elastomers used in ventilation systems components. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Also, this program provides input to the corrective action program if aging effects are identified. The staff accepted the work control process program for managing the aging effects of cracking and change in material properties and its evaluation of this program is documented in Section 3.0.3.3.4 of this SER. The staff also accepted the general condition monitoring program for managing cracking and change of material properties since visual inspections will be performed on external surfaces to identify any sign of aging degradation. The staff's evaluation of the general condition monitoring program is documented in Section 3.0.3.3.2 of this SER.

In LRA Section 3.2.2.2.2, the applicant stated that loss of material due to wear is not an AERM for the elastomers in the ventilation systems. During the audit and review, the staff reviewed the applicant's basis and determined that the elastomers in the ventilation systems are not subject to motions which could result in wear. Based on the lack of motion, the staff finds that the loss of material due to wear is not an aging effect requiring management for the elastomers in the ventilation system.

3.3A.2.2.3 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.3A.2.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking

The staff reviewed LRA Section 3.3.2.2.4 against the criteria in SRP-LR Section 3.3.2.2.4. In LRA Section 3.3.2.2.4, the applicant addressed the potential for cracking in the high-pressure pumps of the chemical and volume control system (CVCS).

SRP-LR Section 3.3.2.2.4 addresses crack initiation and growth due to cracking in the high-pressure pumps in the CVCS. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA that cracking is not identified as an AERM for the CVCS high-pressure pump casing. The high-pressure pump casing is constructed of stainless steel and operates at temperatures less than 140 °F. SCC is applicable to stainless steel components in aqueous environments that experience operating temperatures greater than 140 °F.

The applicant stated that based on industry experience, a temperature criterion of greater than 140 °F is used as the threshold for susceptibility of austenitic stainless steels to SCC. No instances were identified that would bring this temperature threshold into question. On the basis of its review, the staff finds the applicant's statement reasonable and acceptable because the applicant's bases for excluding the aging effects of cracking in the CVCS high-pressure pump casing are consistent with industry and site operating experience.

3.3A.2.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

The staff reviewed LRA Section 3.3.2.2.5 against the criteria in SRP-LR Section 3.3.2.2.5. In LRA Section 3.3.2.2.5, the applicant addressed the loss of material from corrosion that could occur on internal and external surfaces of components exposed to air and the associated range of atmospheric conditions.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, auxiliary and radwaste area, primary containment heating and ventilation systems, piping of the diesel generator building ventilation system, aboveground piping and fittings, valves, and pumps in the diesel fuel oil system and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, and crevice corrosion, and MIC could occur in the duct fittings, access doors and closure bolts, equipment frames, and duct housing. Loss of material due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler units, and due to general corrosion could occur on the external surfaces of all carbon steel SCs, including bolting, exposed to operating temperatures less than 212 °F in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated that AMP B2.1.10, “Fire Protection Program;” AMP B2.1.24, “Tank Inspection Program;” and AMP B2.1.25, “Work Control Process,” managed loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components. Loss of material for external surfaces of carbon steel components is effectively managed by AMP B2.1.3, “General Condition Monitoring;” AMP B2.1.10, “Fire Protection Program;” AMP B2.1.23, “Structures Monitoring Program;” and AMP B2.1.24, “Tank Inspection Program.” Also, the applicant stated that AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” managed this aging effect for components in infrequently accessed areas.

The staff identified a discrepancy between LRA Table 3.3.2-31, ”Auxiliary Systems - Unit 2 Fire Protection,” and LRA Table 3.3.2-32, “Auxiliary Systems - Unit 3 Fire Protection.” In LRA Table 3.3.2-31(page 3-281), the applicant stated, for carbon steel pipe exposed internally to moist air, that the fire protection program is used for managing the aging effects of loss of material. In LRA Table 3.3.2-32 (page 3-291), the applicant credited the work control process program to manage loss of material and references Table 3.3.1, Item 3.3.1-05. During the audit and review, the applicant was requested to clarify which is correct. In an LRA supplement dated July 7, 2004, the applicant stated that LRA Table 3.3.2-32, the "Work Control Process" AMP for the carbon steel 'Pipe' component group exposed internally to an air environment, should be replaced with the "Fire Protection Program” AMP. The “NUREG-1801" item should be “VII.H2.3-a” and the “Notes” should be “C, 2.” The staff reviewed the applicant’s response and finds it to be acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds the work control process program acceptable for managing the aging effects of loss of materials due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components.

The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The fire protection program is consistent with GALL AMPs XI.M.26, “Fire Protection,” and XI.M.27, “Fire Water System.” On the basis of its review, the staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation when the system is opened for maintenance and/or repair.

The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. The tank inspection program is consistent with GALL AMP XI.M.29, “Aboveground Carbon Steel Tanks.” On the basis of its review, the staff finds that the tank inspection program is acceptable for managing loss of material due to general corrosion since wall thickness measurements will be performed on the lower portion of the tank.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program uses visual inspections to detect evidence of degradation or adverse conditions in accessible plant areas. System engineers perform comprehensive visual inspections during walkdowns of plant systems and components during normal operation and during refueling outages; plant equipment operators perform equipment and structures inspections twice a day to maintain awareness of system and plant operation and material condition during normal operation and refueling outages. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of materials since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties by monitoring structures and structural support systems that are within the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 as addressed in RG 1.160, Revision 2, and NUMARC 93-01, Revision 2. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures within the scope of license renewal (such as non-safety-related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. On the basis of its review, the staff finds that the structures monitoring program is acceptable for managing loss of material since visual inspections will be performed on external surfaces for any sign of aging degradation.

The staff reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The infrequently accessed areas inspection program is a new, plant-specific program that manages the aging effects of loss of material using visual inspections of the external surfaces of SCs. The program encompasses infrequently accessed areas of the plant which contain in-scope equipment. All areas not normally accessible for inspection and evaluation, and that contain SCs subject to aging management, have been identified for inclusion in the program. On the basis of its review, the staff finds that the infrequently accessed areas inspection program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components, since visual inspections will be performed on external surfaces to detect any sign of aging degradation in the service water system.

During the audit and review, the staff questioned why various portions of the diesel generator system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement dated July 7, 2004, the applicant added several components in the diesel generator system to those that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the diesel generator system AMR for components addressed by LRA Section 3.3.2.2.5. Based on the applicant’s addition of diesel generator system components as subject to AMR, the staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the diesel generator system is documented in Section 2.3A.3.35 of this SER.

3.3A.2.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion

The staff reviewed LRA Section 3.3.2.2.6 against the criteria in SRP-LR Section 3.3.2.2.6. In LRA Section 3.3.2.2.6, the applicant addressed further evaluation of programs to manage loss of material in the RCP oil collection system to verify the effectiveness of the fire protection program.

SRP-LR Section 3.3.2.2.6 states that loss of material due to general, galvanic, pitting, and crevice corrosion could occur in tanks, piping, valve bodies, and tubing in the RCP oil collection system in fire protection. The fire protection program relies on a combination of visual and volumetric examinations, in accordance with the guidelines of 10 CFR 50 Appendix R and Branch Technical Position 9.5-1, to manage loss of material from corrosion. However, corrosion may occur at locations where water from wash downs may accumulate. Therefore, verification of the effectiveness of the program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, galvanic, pitting, and crevice corrosion to verify the effectiveness of the program. A one-time inspection of the bottom half of the interior surface of the RCP oil collection system tank is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The applicant stated in the LRA that loss of material is managed for the components associated with the RCP oil collection system by MPS AMP B2.1.24, “Tank Inspection Program,” which subjects the RCP oil collection tanks to periodic internal and external inspections. Additionally, during containment close-out activities, the RCP oil collection tanks are visually inspected and verified to be empty.

The staff reviewed the tank inspection program, which is consistent with GALL AMP XI.29, “Aboveground Carbon Steel Tanks,” and its evaluation is documented in Section 3.0.3.2.17 of this SER. Since the tank inspection program includes volumetric examinations for wall thickness measurement of the RCP oil collection tank, the staff finds the program acceptable for managing loss of material due to general, galvanic, pitting, and crevice corrosion.

The applicant referenced LRA Table 3.3.1, Item 3.3.1-06 (page 3-190), for components exposed internally to lube oil (Note 14) and loss of material aging effect combination in LRA Table 3.3.2-32, and credited the work control process program. In LRA Table 3.3.1, Item 3.3.1- 06, the applicant stated that the loss of material aging effect is managed by the tank inspection program. The staff noted that there is no mention in the table about the work control process program. During the audit, the staff requested the applicant clarify the omission. In its LRA supplement, dated July 7, 2004, the applicant stated that LRA Table 3.3.1, Item 3.3.1-06, should include the following words between the second and third sentences:

> For the non-tank components, loss of material is managed by the work control process program.

Additionally, the applicant stated in the LRA supplement that LRA Section 3.3.2.2.6 (page 3-184) should include the following words at the end of the first sentence:

> For the non-tank components, loss of material is managed by the work control process program.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds the work control process program acceptable for managing the aging effects of loss of material.

3.3A.2.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

The staff reviewed LRA Section 3.3.2.2.7 against the criteria in SRP-LR Section 3.3A.2.2.7. In LRA Section 3.3.2.2.7, the applicant addressed further evaluation of programs to manage loss of material in the diesel fuel oil system to verify the effectiveness of the diesel fuel monitoring activities.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, and crevice corrosion and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing AMP relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709, and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M30, “Fuel Oil Chemistry,” and GALL AMP XI.M32, “One Time Inspection,” for management of this aging effect.

The applicant stated in the LRA that MPS AMP B2.1.12, “Fuel Oil Chemistry,” manages loss of material for diesel fuel oil tanks and other components in the diesel generator fuel oil system, the security system, and the station blackout diesel generator system. In lieu of a one-time inspection program as described in SRP-LR Section 3.3.2.2.7, the applicant stated in LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program, and that tank inspections performed under the applicant’s MPS AMP B2.1.24, “Tank Inspection Program,” provide additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the staff finds the fuel oil chemistry program to be acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for use in providing confirmation of the effectiveness of the fuel oil chemistry program.

The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. The tank inspection program is consistent with GALL AMP XI.M.29, “Aboveground Carbon Steel Tanks.” On the basis of its review, the staff finds that the tank inspection program is acceptable for providing additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

3.3A.2.2.8 Quality Assurance for Aging Management of Non-safety-related Components

Section 3.0.4 of this SER provides a separate evaluation of the applicant’s Quality Assurance Program.

3.3A.2.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading

The staff reviewed LRA Section 3.3.2.2.9 against the criteria in SRP-LR Section 3.3.2.2.9. In LRA Section 3.3.2.2.9, the applicant addressed further evaluation of programs to manage cracking in the chemical and volume control system (CVCS) to verify the effectiveness of the water chemistry control program.

SRP-LR Section 3.3.2.2.9 states that crack initiation and growth due to SCC and cyclic loading could occur in the channel head and access cover, tube sheet, tubes, shell and access cover, and closure bolting of the regenerative heat exchanger and in the channel head and access cover, tube sheet, and tubes of the letdown heat exchanger in the CVCS. The water chemistry program relies on monitoring and control of water chemistry based on the EPRI TR-105714 guidelines for primary water chemistry to manage the effects of crack initiation and growth due to SCC and cyclic loading. Verification of the effectiveness of the chemistry control program should be performed to ensure that crack initiation and growth are not occurring. The GALL Report recommends further evaluation to manage crack initiation and growth from SCC and cyclic loading for these systems to verify the effectiveness of the water chemistry program. A one-time inspection of selected components and susceptible locations is an acceptable method to ensure that crack initiation and growth are not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP X1.M2, "Water Chemistry," and a plant-specific verification program for management of this aging effect.

The applicant stated in the LRA that cracking due to SCC for the regenerative and letdown heat exchangers is managed by MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." Verification of the effectiveness of the chemistry control program is provided by MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of a condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The chemistry control for primary systems program is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of crack initiation and growth. On the basis of its review, the staff finds that the work control process program is acceptable for managing crack initiation and growth since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.3A.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage pool. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA 3.3.2.2.10 that Boral is not used in the spent fuel pool for neutron absorption. Since Boral is not used at Unit 2, the staff agrees that this line item is not applicable.

3.3A.2.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The staff reviewed LRA Section 3.3.2.2.11 against the criteria in SRP-LR Section 3.3.2.2.11. In LRA Section 3.3.2.2.11, the applicant addressed the potential for loss of material in buried piping of the service water and diesel fuel oil systems.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

The AMP recommended by the GALL Report is GALL AMP XI.M34, “Buried Piping and Tanks Inspection.”

The applicant stated in the LRA that loss of material for buried piping and valves in the service water system, and in the Unit 2 fire protection system, Unit 3 fire protection system, and enclosure building filtration system, is managed by AMP B2.1.4, “Buried Pipe Inspection Program.”

In the LRA, the applicant stated that as part of the buried pipe inspection program, a baseline inspection of representative in-scope buried piping is performed, which provides an effective method for detection of aging effects. In addition, inspections are performed when the buried components are excavated for maintenance or any other reason and provide an effective method to evaluate the condition of the buried piping and protective coatings. Operating experience with age-related degradation of buried piping is limited and no failures of in-scope buried piping have been identified.

Also, the applicant stated that there is no buried piping in the diesel fuel oil systems.

The staff reviewed the buried pipe inspection program and its evaluation is documented in Section 3.0.3.2.1 of this SER. The staff finds that the buried pipe inspection program is consistent with GALL AMP XI.M28, “Buried Piping and Tanks Surveillance,” and GALL AMP XI.M34, “Buried Piping and Tanks Inspection,” with exceptions and enhancements. The staff also finds the exceptions and enhancements to be acceptable. The staff reviewed the plant operating experience and found that the program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. On the basis of its review, the staff finds that the buried pipe inspection program is acceptable for managing the aging effects of loss of material in buried piping and fittings.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.3.2-1 through 3.3.2-41 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In Tables 3.3.2-1 through 3.3.2-41, the applicant indicated, via Notes F through J, that neither the identified component nor the material/environment combination is evaluated in the GALL Report and provided information concerning how the AERM will be managed.

Staff Evaluation. For component type material/environment combinations not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff requested the applicant to provide additional information on the issues described in the following general RAIs. These RAIs, the applicant’s response, and the staff’s evaluation of the responses are described below.

Cracking in Dux Seal Joint Seals (RAI 3.3-A-2). The LRA identifies cracking in ductwork joint seals using Dux Seal material for various ventilation system components in the auxiliary systems. The general condition monitoring program is credited with managing this aging effect through the use of visual inspections of external surfaces and the LRA tables do not identify aging effects for ductwork seals exposed to the internal environment. In some cases, drying and cracking of seals from the internal environment with continuous air flow could potentially be more severe than the external environment. The general condition monitoring AMP, described in LRA Section B2.1.13, did not identify specific criteria, including the inspection frequency and its technical basis, unique to managing ductwork joint seals; and it was not clear how external visual inspections will manage internal degradation. The applicant was requested to clarify how visual inspection of the external surfaces of ductwork joint seals is adequate to detect internal cracking prior to loss of the component pressure boundary function. In addition, the general condition monitoring program is limited to accessible plant areas. The applicant was requested to clarify how ductwork joint seals in inaccessible areas are inspected and/or tested for cracking. The applicant was also requested to provide the inspection frequency, including its technical basis, and the operational history to demonstrate the effectiveness of the general condition monitoring program to manage cracking in ductwork joint seals.

By letter dated November 9, 2004, the applicant responded as follows:

> Dux Seal is an adhesive/sealant-saturated fabric cloth that is applied to the external surface of the ductwork at the crimped and rivited joints in order to provide a leak-tight seal. The material (also termed Hardcast) cures hard and rigid, and is not similar to duct tape. Since it is applied to the ouside surface of the duct, the primary exposure environment is ambient air. No aging effects are expected to originate from inside the ductwork due to the limited exposure to the ductwork internal environment. Therefore,

the cracking aging effect has been determined to require management due to the external environment.

Ductwork is generally not routed through inaccessible areas of the plant, and no inaccessible ductwork joint seals were identified as part of the aging management review.

The cracking aging effect for the ductwork joint seals is visually observable during the inspections performed as part of the general condition monitoring aging management program as described in LRA Appendix B, Section B2.1.13. Inspections are performed by the systems engineers as part of the comprehensive system evaluations performed quarterly, and by the plant equipment operators during daily rounds of plant areas to verify proper component and system operation. Significant degradation of the ductwork joint seals has not been identified, however, the effectiveness of the General Condition Monitoring AMP is demonstrated by operating experience associated with other plant components as cited in Appendix B, Section B2.1.13.

The staff reviewed the applicant’s response and determined that the response was reasonable and acceptable because the applicant provided sufficient information to conclude that cracking in ductwork joint seals will be adequately managed by the general condition monitoring program during the period of extended operation. The applicant clarified that Dux Seal is an adhesive/sealant-saturated fabric cloth that cures hard and rigid. Since this material is applied to the outside surface of ductwork joints, there is limited exposure to the internal environment and cracking is applicable to the external environment. The applicant also identified that no inaccessible ductwork joint seals were identified as part of the aging management review and significant degradation of the ductwork joint seals has not been identified. Further, the applicant clarified that cracking in ductwork joint seals is visually observable during the comprehensive system evaluations performed by system engineers quarterly and by plant equipment operators during daily rounds of plant areas to verify proper component and system operation. On the basis of the applicant’s response, all issues related to RAI 3.3-A-2 are resolved.

Selective Leaching in Copper Alloys (RAI 3.3-A-3). LRA Tables 3.3.2-34 and 3.3.2-36 for the diesel generator and station blackout diesel generator respectively identify loss of material as an aging effect applicable to nickel-based alloys and copper alloys exposed to a moisture-laden air and/or intermittently wetted environment. The LRA did not identify the alloy zinc content for these materials. The LRA credited the work control process program for managing loss of material in the interior of nickel-based alloy valves and the general condition monitoring program for managing loss of material on the exterior of copper alloy radiators. These AMPs primarily rely on visual inspections. Industry documents, such as EPRI report 1003056, “Non-Class-1 Mechanical Implementation Guideline and Mechanical Tools,” Rev. 3, identify various corrosion mechanisms, including selective leaching, that cause loss of material in copper alloys with greater than 15 percent zinc content in an air environment subject to moisture. Loss of material from selective leaching is specifically addressed in GALL AMP XI.M33, but page B-7 of the LRA states that the AMRs did not identify the need for this AMP. The applicant was requested to identify the alloy zinc content for these materials and clarify if selective leaching is an applicable aging mechanism. If selective leaching is an applicable aging mechanism, the applicant was requested to clarify if hardness measurement and one-time inspection required by GALL AMP XI.M33 will be used to manage the aging effect.

By letter dated November 9, 2004, the applicant responded as follows:

> Dominion conservatively assumed that all copper alloys were of a material composition that could be susceptible to selective leaching. Accordingly, the zinc content for copper alloys was not identified in the LRA since it was not used as an input to the evaluation of aging mechanisms. Selective leaching was not considered to be an applicable aging mechanism for nickel-based alloys.
>
> Selective leaching of copper alloys was not considered to be significant in a moisture-laden air and/or an intermittently wetted environment unless conditions were conducive to water collection or pooling which would cause wetting for a significant period of time. If water collection or pooling was present for a component, the component was evaluated for a raw water environment as defined in LRA Table 3.0-1.
>
> The copper alloy components in the diesel generator system associated with moisture-laden air are the pipes and tubes of the turbocharger and intercooler air systems. Wetting is possible during the operation of these components which normally occurs only during monthly Technical Specification surveillance testing. Wetted conditions would dissipate after use due to the elevated temperatures of operation. Therefore wetting for a significant time period would not occur.
>
> The copper alloy component in the diesel generator system associated with intermittent wetting is the level indicator (sight glass) on the jacket cooling water expansion tanks. Portions of this component are normally dry but may occasionally become wetted. Wetting for a significant time period is not expected.
>
> The copper alloy component in the station blackout diesel generator system associated with intermittent wetting is the radiator that is exposed to an atmosphere/weather environment. Atmosphere/weather environments and selective leaching are discussed in the response to RAI 3.3-B-2.
>
> Based on the above, loss of material due to selective leaching was not identified as an aging effect for these components and the work control process and the general condition monitoring AMPs provide management of this aging effect.

The staff reviewed the applicant's response and determined that the response was reasonable and acceptable because the applicant provided sufficient information to conclude that selective leaching is not a significant aging mechanism causing loss of material in copper alloy materials in the diesel generator and station blackout diesel generator systems exposed to periodic moisture. This conclusion is in part based on the applicant's clarified environmental conditions that copper alloy components in these systems exposed to moisture-laden air and/or intermittently wetted conditions are not exposed to wetted conditions for a significant period of time. The staff agrees that selective leaching of nickel alloys is not considered to be a concern in this environment. In addition, the applicant has agreed in its letter, dated July 7, 2004, to include appropriate inspection criteria for selective leaching to its work control process AMP. On the basis of the applicant's response, all issues related to RAI 3.3-A-3 are resolved.

The systems specific staff evaluation is discussed below.

3.3A.2.3.1 Circulating Water - Aging Management Evaluation - Table 3.3.2-1

The staff reviewed LRA Table 3.3.2-1, which summarizes the results of AMR evaluations for the circulating water system component groups. In the LRA, the applicant proposed to manage loss of material of stainless steel pipe and valve component types exposed to air using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant stated, in the technical report of AMR results for open water, that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

The staff reviewed the current industry research and operating experience. On the basis of its review, the staff finds the applicant correctly identified that no aging effects for rubber expansion joints in air, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95 °F.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to seawater. The applicant stated in the technical report of AMR results for open water, that change of material properties and cracking due to thermal exposure of rubber components in seawater are aging effects that do not require aging management for the components in this system.

On the basis of current industry research and operating experience, the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95 °F. For, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95 °F, since the internal water (raw water from the Long Island Sound) is significantly less than 95 °F. On the basis of its review, the staff finds that the applicant correctly identified no aging effect for this component, since they are not exposed to temperatures greater than 95 °F.

3.3A.2.3.2 Screen Wash - Aging Management Evaluation - Table 3.3.2-2

The staff reviewed LRA Table 3.3.2-2, which summarizes the results of AMR evaluations for the screen wash system component groups.

In the LRA, the applicant proposes to manage loss of material of stainless steel tubing and valves and copper alloys strainers and valve component types exposed to air using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material on external surfaces of the stainless steel components (due to pitting and crevice corrosion) and copper alloys components (due to general corrosion), since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for fiberglass piping component types exposed to air. The applicant stated in the technical report for AMR results for open water, that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explains that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism, and review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems for this evaluation.

On the basis of its review of the applicant’s technical report, current industry research, and operating experience, the staff finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the LRA, the applicant identified no aging effects for fiberglass piping component types exposed to seawater. The applicant stated in the technical report for AMR results for open water, that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color, and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect.

On the basis of its review of the applicant’s technical report, current industry research, and operating experience, the staff concurs that the fiberglass components in a seawater environment are not exposed to high levels of ultraviolet radiation or ozone. Therefore, the staff finds that cracking in fiberglass components in seawater is not an aging effect that requires aging management.

In the LRA, the applicant identified no aging effects for polyvinyl chloride (PVC) valve component types exposed to air and seawater. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. The material aging effect report (MAER) identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to seawater, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The AMR evaluated PVC components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high-voltage electrical equipment.

On the basis of its review of the applicant’s technical report, current industry research, and operating experience, the staff concurs with the applicant and finds that reduction in strength of PVC components in an air or seawater environment is not an aging effect that requires aging management.

3.3A.2.3.3 Service Water - Aging Management Evaluation - Table 3.3.2-3

The staff reviewed LRA Table 3.3.2-3, which summarizes the results of AMR evaluations for the service water system component groups. In LRA Table 3.3.2-3, the applicant proposed to manage buildup of deposits for carbon steel pipe and strainers, and cast iron pipe component types exposed to seawater using AMP B2.1.21, “Service Water System (Open-Cycle Cooling),” which is consistent with GALL AMP XI.M20, “Open-Cycle Cooling Water System.” However, buildup of deposits due to biofouling is not identified in the GALL Report as an aging effect for the pipes and strainers component types.

The applicant stated, in the AMR results for open water, that the carbon steel and cast iron material-lined piping interfaces with seawater and is subject to macro-fouling, silting, and sedimentation. Therefore, buildup of deposits is a potential aging effect that requires aging management for these components.

The applicant stated in LRA Appendix C (page C-24) that buildup of deposits due to biofouling is an aging effect requiring management for heat exchanger tubes, tube sheets, and lined components. The applicant stated that lined piping was included because piping can contribute to heat exchanger fouling since small segments of the coating can become detached and foul associated heat exchangers. Buildup of deposits does not directly affect the pressure boundary of the lined piping. However, prolonged operation with deteriorated coatings would lead to loss of material. For this reason, both buildup of deposits and loss of material are managed by the service water system (open-cycle cooling) aging management activity. Specifically, internal visual inspections of the service water piping are periodically performed.

During the audit and review, the staff asked the applicant to provide justification as to why buildup of deposits is not applied to stainless steel service water filters/strainers since filtration is an intended function. The applicant responded that the stainless steel service water filters/strainers are not lined. Although filtration is an intended function, clogging of the filter is an expected service condition and does not result from age-related degradation. The stainless steel service water filters/strainers in question are equipped with differential pressure gauges and are periodically cleaned based on differential pressure.

The staff reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 3.0.3.2.15 of this SER. On the basis of its review of the applicant's program and technical report, together with current industry research and operating experience, the staff finds that the service water program is acceptable for managing buildup of deposits for the lined components, since internal visual inspections of the service water components will be periodically performed to detect any sign of deposit build-up.

In the LRA, the applicant proposed to manage loss of material of copper alloy tubing and valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds use of the general condition monitoring program in lieu of the boric acid corrosion program acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In LRA Table 3.3.2-3, the applicant proposed to manage loss of material for nickel-based alloy expansion joints and tubing exposed to seawater using MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling)," which is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System." However, loss of material for nickel-based component types in treated water as a component, material, environment, and aging effect combination is not identified in the GALL Report.

The applicant stated in the AMR results for open water that the nickel-based alloys, related to pitting, in seawater are exposed to low-flow conditions with an aggressive environment. Therefore, pitting corrosion is a potential aging mechanism.

The staff reviewed the service water system (open-cycle cooling) program and its evaluation is documented in Section 3.0.3.2.15 of this SER. The staff finds that the service water system (open-cycle cooling) program is acceptable for managing loss of material (due to pitting corrosion) of nickel-based alloy components in a seawater environment for this system, since this program implements the intent of GL 89-13.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy pipe, tubing, valves, filter/strainers, flow elements, flow indicators, flow orifices, pumps, and restricted orifices component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The environments are not in the GALL Report for this component type and material.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for the fiberglass service water pump motor protective tank exposed to air. The applicant stated in the AMR results report for open water that reduced strength due to ozone exposure of non-metallic components is possible in an air environment. The applicant explained that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism, and review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems for this evaluation.

On the basis of its review of the applicant’s technical report, current industry research, and operating experience, the staff concurred and finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant stated in the AMR results for open water that change of material properties due to thermal exposure and irradiation, and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

On the basis of its review of the applicant’s technical report, current industry research, and operating experience, the staff concurred and finds that no aging effect for rubber expansion joints in air is acceptable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95°F.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to seawater. The applicant stated in the AMR results for open water that change of material properties and cracking due to thermal exposure of rubber components in seawater are aging effects that do not require aging management for the components in this system.

On the basis of current industry research and operating experience, the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95 °F. For, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95 °F, since the temperature of the internal water (raw water from the Long Island Sound) is significantly less than 95 °F. On the basis of its review, the staff finds that the applicant correctly identified no aging effect for this item, since these components are not exposed to temperatures greater than 95 °F.

3.3A.2.3.4 Sodium Hypochlorite - Aging Management Evaluation - Table 3.3.2-4

The staff reviewed LRA Table 3.3.2-4, which summarizes the results of AMR evaluations for the sodium hypochlorite system component groups.

In the LRA, the applicant proposed to manage loss of material of stainless steel valve component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The environments are not in the GALL Report for this component type and material. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for PVC pipes and valves exposed to air or in a seawater environment. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. The MAER identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to seawater, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The applicant stated that it evaluated PVC components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high-voltage electrical equipment.

On the basis of its review of the applicant's technical report, current industry research, and operating experience, the staff finds that reduction in strength of PVC components in an air or seawater environment is not an aging effect that requires aging management.

3.3A.2.3.5 Reactor Building Closed Cooling Water - Aging Management Evaluation - Table 3.3.2-5

The staff reviewed LRA Table 3.3.2-5, which summarized the results of AMR evaluations for the reactor building closed cooling water (RBCCW) system component groups.

In the LRA, the applicant proposed to manage loss of material for RBCCW heat exchanger copper alloy tubes in treated water using AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on the external surfaces of heat exchanger tubes to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy valve external surfaces caused by borated water leakage using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy valves, flow elements, flow indicators, flow orifices, flow switches, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

3.3A.2.3.6 Chilled Water - Aging Management Evaluation - Table 3.3.2-6

The staff reviewed LRA Table 3.3.2-6, which summarized the results of AMR evaluations for the chilled water system component groups.

In the LRA, the applicant proposed to manage loss of material of carbon steel chiller water surge tank component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy tubing and valve external surfaces caused by borated water leakage using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on the external surfaces of copper alloy components in this system, since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy tubing, valves, level indicators, flow elements, moisture indicators, and pumps component types exposed to a moisture-laden air and/or intermittently wetted environments using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on the external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and copper alloy components exposed internally to gas for chilled water shell and tubes, chilled water evaporators tubes, compressor casings, filter/strainers, level indicators, moisture indicators, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging effects that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

3.3A.2.3.7 Instrument Air - Aging Management Evaluation - Table 3.3.2-7

The staff reviewed Table 3.3.2-7 of the LRA and Table 3.3.2-7a in the LRA supplement letter dated January 11, 2005, which summarizes the results of AMR evaluations for the instrument air system component groups. The staff reviewed the technical report of AMR results for air and gas systems.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, regulators, tubing, and valve component types exposed to a borated water leakage external environment using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion,” to manage this aging effect. The applicant stated, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for the management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valves component types exposed to a borated water leakage external environment.

In the LRA and the applicant’s letter, dated January 11, 2005, the applicant identified no aging effects for carbon steel, stainless steel, copper alloys, and PVC components exposed internally and externally to air, including accumulators (reserve air bottles), pipe, valves, hoses, regulators, tubing, tubing (stored tubing and fittings), compressor after coolers (shell), compressors and containment instrument air receiver tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to air. Therefore, the staff finds that there are no applicable aging effects requiring management for metal or PVC in an air environment.

3.3A.2.3.8 Nitrogen - Aging Management Evaluation - Table 3.3.2-8 and Table 3.3.2-8a

The staff reviewed Table 3.3.2-8 of the LRA and Table 3.3.2-8a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the nitrogen system component groups. The staff reviewed the technical report of AMR results for air and gas systems.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for stainless steel components exposed externally to air, including pipe, valves, and flow indicator component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for stainless steel components exposed internally to gas for pipe, valves and flow indicator component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

3.3A.2.3.9 Station Air - Aging Management Evaluation - Table 3.3.2-9 and Table 3.3.2-9a

The staff reviewed Table 3.3.2-9 of the LRA and Table 3.3.2-9a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the station air system component groups. The staff reviewed the technical report of AMR results for air and gas systems.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for carbon steel, copper alloys, and cast iron components exposed externally to air, including pipe, valves, air compressor after coolers (shell), air compressor intercoolers (shell), and compressors component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Carbon steel and cast iron components that are exposed externally to a sheltered air environment and not exposed to moisture-laden air or intermittent wetting are expected to experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. In addition, the applicant stated that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program performs inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. The staff finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks.

3.3A.2.3.10 Chemical and Volume Control - Aging Management Evaluation - Table 3.3.2-10

The staff reviewed LRA Table 3.3.2-10, which summarized the results of AMR evaluations for the CVCS component groups.

In the LRA, the applicant identified no aging effects for carbon steel, cast iron, and stainless steel components exposed to air, including boric acid tanks, filter/strainer, flow elements, flow indicators, letdown heat exchangers (channel head), level indicators, pipe, pulsation dampers, pumps, regenerative heat exchangers (channel head), regenerative heat exchangers (shell), suction stabilizers, sump tanks, tubing, valves, volume control tank, filters/strainers (housing-charging pump lube oil), lube oil reservoirs (charging pump), and pumps (charging pump lube oil) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy filter/strainer (housing - charging pump lube oil), lube oil reservoirs (charging pump), pumps (charging pump lube oil), tubing, tubing (charging pump lube oil), and valve component types exposed internally and externally to an environment of oil using MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified.

The staff finds the work control process program acceptable for managing the aging effect of loss of material. The staff's evaluation of the work control process program is documented in Section 3.0.3.3.4 of this SER.

In the LRA, the applicant identified no aging effects for stainless steel components exposed internally to an environment of gas for pipe, pulsation dampers, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

The inservice inspection program is credited for managing cracking in low-alloy steel bolting exposed to air. During its review, the staff determined that additional information concerning the application of this AMP to effectively manage stress corrosion cracking in auxiliary system bolting was needed to complete its review. This request for information is described in RAI 3.3.11-A-1. RAI 3.3.11-A-1, the applicant's response to this RAI and the staff's evaluation of the responses are described below.

The credited inservice inspection program AMP to manage CVCS bolting included exceptions to GALL and RAI 3.3.11-A-1 requested the applicant to clarify if the credited program is different from the GALL bolting integrity for managing cracking in CVCS piping and bolting in the RCPB and to identify the specific differences and the basis for those differences. The RAI also requested the applicant to describe bolting practices to preclude stress corrosion cracking and additional information to assure that aging degradation is detected before the loss of the intended function of the closure bolting.

> <u>RAI 3.3.11-A-1</u>
> For CVCS bolting in an air environment, Note B in LRA Table 3.3.2-10 identifies that the item is consistent with NUREG-1801 for component material, environment and aging

> effect, but the AMP takes some exceptions to NUREG-1801 AMP. LRA Table 3.3.2-10 references LRA item 3.1.1-26 in Table 3.1.1and credits the inservice inspection program for managing cracking in CVCS bolting. LRA item 3.1.1-26 states that this item is not consistent with NUREG-1801 and page B-6 of the LRA states that the aging management reviews did not identify the need for the GALL XI.M18 bolting integrity AMP. NUREG-1339 (referenced in GALL AMP XI.M18) includes a condition that bolting degradation is resolved on the basis of a plant-specific bolting integrity program. Clarify if the credited inservice inspection program is different from the GALL bolting integrity program for managing cracking in CVCS piping and valve bolting in the RCPB. If there are differences, identify those specific differences to the GALL bolting integrity program and the basis for those differences. Describe the bolting practices used to preclude stress corrosion cracking such as the control of high strength bolting materials, lubricants, bolt stress and hardness testing. Also, clarify how a visual inspection of CVCS closure bolting in RCPB piping and valves is effective in detecting fine cracks or cracking in bolting where the entire bolting surfaces are not readily visible.

By letter dated December 3, 2004, the applicant responded by providing the following information:

> As identified in Appendix B2.0, the Millstone LRA did not include a specific bolting integrity aging management program (AMP) description with comparison to NUREG 1801, XI.M18 “Bolting Integrity.” However, due to NRC concerns related to how and where Millstone addressed degradation of bolting, Millstone has developed a specific bolting integrity AMP and is providing a supplement to the Millstone Units 2 and 3 LRAs.

In this letter, the applicant provided both an Appendix A and an Appendix B description of the bolting integrity AMP. The bolting integrity AMP is identified by the applicant as an existing program that is consistent with GALL XI.M18 with clarification and exceptions. The staff review of the new bolting integrity AMP is described in Section 3.0.3.2.18 and Open Items 3.0.3.2.18-1 and 3.0.3.2.18-2.

On the basis of its review of the information provided in the LRA and the additional information included in the applicant’s response to the above RAIs pending resolution of the AMP review, the staff finds the applicant has identified appropriate AMPs for managing the aging effects caused by leaking borated water on external surfaces of the chemical and volume control system component types.

3.3A.2.3.11 Sampling - Aging Management Evaluation - Table 3.3.2-11 and LRA Table 3.3.2-11a

The staff reviewed Table 3.3.2-11 of the LRA and Table 3.3.2-11a in the applicant’s letter, dated January 11, 2005, which summarized the results of AMR evaluations for the sampling system component groups.

In the LRA and the January 11, 2005 supplement, the applicant identified no aging effects for low-alloy steel and stainless steel bolting, pipe tubes, valves and secondary sample station/sink component types exposed externally to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for copper alloys components exposed internally to gas for sample chiller (tubes) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

3.3A.2.3.12 Primary Makeup Water - Aging Management Evaluation - Table 3.3.2-12 and Table 3.3.2-12a

The staff reviewed Table 3.3.2-12 of the LRA and Table 3.3.2-12a of the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the primary makeup water system component groups.

In the LRA and the applicant's January 11, 2005 supplement, the applicant identified no aging effects for low-alloy steel and stainless steel bolting, pipe, flow elements, primary water head tank, pumps, tubing, valves, deaerator transfer pump and make-up water vacuum deaerator component types exposed externally to air. Aging effects for these combinations of components, material, and environment are not identified in the GALL Report.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the applicant's letter, dated January 11, 2005, the applicant proposed to manage loss of material of stainless steel for primary water storage tank component types exposed to an atmosphere/weather environment using AMP B2.1.13, "General Condition Monitoring Program," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

3.3A.2.3.13 Access Control Area Air Conditioning - Aging Management Evaluation - Table 3.3.2-13 and Table 3.3.2-13a

The staff reviewed Table 3.3.2-13 of the LRA and Table 3.3.2-13a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the access control area air conditioning system component groups.

In the LRA and the applicant's January 11, 2005 supplement, the applicant identified no aging effects for carbon steel damper housings and access control area air conditioning unit (housing) components type exposed internally and externally to air environment that is not intermittently wetted.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the components' intended functions due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.14 Main Condensers Evacuation - Aging Management Evaluation - Table 3.3.2-14 and Table 3.3.2-14a

The staff reviewed Table 3.3.2-14 of the LRA and Table 3.3.2-14a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the main condensers evacuation system component groups.

In the LRA and the applicant's January 11, 2005 supplement, the applicant identified no aging effects for carbon steel components exposed externally to air, including damper housing, ductwork, fan/blower housing, pipe, valves, filter/strainers, flow orifices, flow switches, and steam jet air ejector vent condenser (shell) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and CASS are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.15 Containment Air Recirculation and Cooling - Aging Management Evaluation - Table 3.3.2-15

The staff reviewed Table 3.3.2-15 of the LRA, which summarized the results of AMR evaluations for the containment air recirculation and cooling system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including containment air recirculation cooling unit housings, damper housings, ductwork, fan/blower housing, pipe, flow elements, tubing, and valve component types.

The applicant stated in the LRA that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.16 Containment and Enclosure Building Purge - Aging Management Evaluation - Table 3.3.2-16

The staff reviewed LRA Table 3.3.2-16, which summarized the results of AMR evaluations for the containment and enclosure building purge system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housings, ductwork, pipe, and valve component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.17 Containment Penetration Cooling - Aging Management Evaluation - Table 3.3.2-17

The staff reviewed LRA Table 3.3.2-17, which summarized the results of AMR evaluations for the containment penetration cooling system component groups. In the LRA, the applicant has identified no aging effects for carbon steel HVAC components exposed internally and externally to air that are not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.18 Containment Post-Accident Hydrogen Control - Aging Management Evaluation - Table 3.3.2-18

The staff reviewed LRA Table 3.3.2-18, which summarized the results of AMR evaluations for the containment post-accident hydrogen control system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally and externally to air that is not intermittently wetted, including fan/blower housing, pipe, tubing, valves, detection chamber, flexible hose, flow elements, hydrogen recombiner housings, and flow orifices component types.

The applicant stated in the LRA that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.19 Control Room Air Conditioning - Aging Management Evaluation - Table 3.3.2-19

The staff reviewed LRA Table 3.3.2-19, which summarized the results of AMR evaluations for the control room air conditioning system component groups.

In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including compressor casings, control room air handling units (housing), control room filter banks, damper housings, ductwork, fan/blower housings (air-cooled condenser unit), fan/blower housings (control room air handling unit), pipe, valves, and smoke detectors component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including compressor casings (air cooled compressor), filter/dryer, moisture indicator, muffler, pipe, tubing, and valve component types.

The applicant stated in the LRA that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy components exposed internally to an environment of gas for compressor casings, compressor casings (air-cooled condenser), control room air handling units (coils), filter/dryer, moisture indicator, mufflers, pipe, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

During the audit and review, the staff questioned why various portions of the control room air conditioning system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement letter dated July 7, 2004, the applicant added several components to the control room air conditioning system components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the control room air conditioning system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the control room air conditioning system AMR is documented in Section 2.3A.3.19 of this SER.

3.3A.2.3.20 Control Element Drive Mechanism Cooling - Aging Management Evaluation - Table 3.3.2-20

The staff reviewed LRA Table 3.3.2-20, which summarized the results of AMR evaluations for the CEDM cooling system component groups. In the LRA, the applicant proposed to manage loss of material of stainless steel CEDM cooling coils component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, “Work Control Process,” which is a plant-specific program.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.3A.2.3.21 Diesel Generator Ventilation - Aging Management Evaluation - Table 3.3.2-21

The staff reviewed LRA Table 3.3.2-21, which summarized the results of AMR evaluations for the diesel generator ventilation system component groups. In the LRA, the applicant has identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.22 ESF Room Air Recirculation - Aging Management Evaluation - Table 3.3.2-22

The staff reviewed LRA Table 3.3.2-22, which summarized the results of AMR evaluations for the ESF room air recirculation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, fan/blower housing, ESF room air recirculation unit housings, and pipe component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.
The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.23 Enclosure Building Filtration - Aging Management Evaluation - Table 3.3.2-23

The staff reviewed LRA Table 3.3.2-23, which summarized the results of AMR evaluations for the enclosure building filtration system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, enclosure building filtration filter bank housing, fan/blower housing, pipe, valves, and flow elements component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including tubing and valve component types.

The applicant stated in the LRA that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.24 Fuel Handling Area Ventilation - Aging Management Evaluation - Table 3.3.2-24

The staff reviewed LRA Table 3.3.2-24, which summarized the results of AMR evaluations for the fuel handling area ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, pipe, valves, and flow elements component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.25 Main Exhaust Ventilation - Aging Management Evaluation - Table 3.3.2-25

The staff reviewed LRA Table 3.3.2-25, which summarized the results of AMR evaluations for the main exhaust ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed to an internally or externally to air that is not intermittently wetted, including damper housing, ductwork, filter bank housing, pipe, tubing, and valve component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the

basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including the tubing component type.

The applicant stated in the LRA that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.
The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.26 Non-Radioactive Area Ventilation - Aging Management Evaluation - Table 3.3.2-26

The staff reviewed LRA Table 3.3.2-26, which summarized the results of AMR evaluations for the non-radioactive area ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, and fan/blower housing component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.
The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.27 Process and Area Radiation Monitoring - Aging Management Evaluation - Table 3.3.2-27

The staff reviewed LRA Table 3.3.2-27, which summarized the results of AMR evaluations for the process and area radiation monitoring system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including bolting, pipe, tubing, valves, fan blower housing, filter housing, and radiation detectors component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

During the audit and review, the staff questioned why various portions of the process and area radiation monitoring system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement dated July 7, 2004, the applicant added several components to the process and area radiation monitoring system list of components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the process and area radiation monitoring system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. Therefore, the staff's evaluation of the scope of the process and area radiation monitoring system AMR is documented in Section 2.3A.3.27 of this SER.

3.3A.2.3.28 Radwaste Area Ventilation - Aging Management Evaluation - Table 3.3.2-28

The staff reviewed LRA Table 3.3.2-28, which summarized the results of AMR evaluations for the radwaste area ventilation system component groups. In the LRA, the applicant has identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings and ductwork component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed "warm, moist air"

to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.
The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.29 Turbine Building Ventilation - Aging Management Evaluation - Table 3.3.2-29

The staff reviewed LRA Table 3.3.2-29, which summarized the results of AMR evaluations for the turbine building ventilation system component groups. In the LRA, the applicant has identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including the damper housings component type.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3A.2.3.30 Vital Switchgear Ventilation - Aging Management Evaluation - Table 3.3.2-30

The staff reviewed LRA Table 3.3.2-30, which summarized the results of AMR evaluations for the vital switchgear ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and cast iron HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, DC switchgear air conditioning unit housings, ductwork, fan/blower housings, motor control center (MCC) air conditioning unit housing, pipe, valves, vital switchgear cooling unit housings, and West 480V LCR cooling unit housings component types.

The applicant stated in the LRA that surfaces of carbon steel and cast iron components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy HVAC components exposed externally to air that is not intermittently wetted, including MCC air conditioning units (accumulator), MCC air conditioning units (distributor), MCC air conditioning units (evaporator coil), MCC air conditioning units (filter/dryer), MCC air conditioning units (receiver), MCC air conditioning units (sight glass housing), MCC air conditioning units (tubing), and MCC air conditioning units (valves) component types.

The applicant stated in the LRA that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interpreted the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy components exposed internally to an environment of gas for MCC air conditioning units (accumulator), MCC air conditioning units (distributor), MCC air conditioning units (evaporator coil), MCC air conditioning units (condenser coil), MCC air conditioning units (filter/dryer), MCC air conditioning units (receiver), MCC air conditioning units (sight glass housing), MCC air conditioning units (tubing), and MCC air conditioning units (valves) component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

3.3A.2.3.31 Unit 2 Fire Protection - Aging Management Evaluation - Table 3.3.2-31

The staff reviewed LRA Table 3.3.2-31, which summarized the results of AMR evaluations for the Unit 2 fire protection system component groups.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including flame arrestors, flex connections, flow indicators, flow orifices, nozzles, pipe, pumps, retard chambers, sprinkler heads, strainers, tubing, valves, and water motor gongs component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel drip pans and tubing component types exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.13, “General Condition Monitoring Program,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion,” to manage this aging effect. The applicant stated in Note 1 that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment.

In the LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, and copper alloy components exposed internally to an environment of air or gas, including flex connections, flow orifices, nozzles, pipe, sprinkler heads, tubing, valves, and water motor gongs component types. Gas is not identified in the GALL Report as an environment for these components and materials. However, the staff identified a discrepancy between Unit 2 fire protection system sprinkler heads and Unit 3 fire protection sprinkler heads in that the sprinkler heads in Unit 3 were in a moist air environment and had an aging effect of loss of materials. In its LRA supplement dated July 7, 2004, the applicant stated that the Unit 2 fire protection system, as presented in LRA Table 3.3.2-31 (page 3-282), Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy “sprinkler head” component group exposed internally to an air environment for the Unit 2 fire protection system. The aging effect of “loss of material” should be added to this component group. The fire protection program will manage these aging effects. Based on the addition of this aging effect, the staff finds the applicant’s response to be acceptable.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal components in a gas environment.

The applicant, in the LRA, proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.10, “Fire Protection Program,” which is consistent with GALL AMP XI.M26, “Fire Protection,” and GALL AMP XI.M27, “Fire Water System.” The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. On the basis of its review, the staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the LRA, the applicant proposed to manage loss of material of stainless steel flex connections component type exposed internally to an environment of oil using AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

3.3A.2.3.32 Unit 3 Fire Protection - Aging Management Evaluation - Table 3.3.2-32

The staff reviewed LRA Table 3.3.2-32, which summarized the results of AMR evaluations for the Unit 3 fire protection system component groups.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including carbon dioxide (CO_2) tank cooling coils, coolant heat exchangers, flex hoses, flex connections, flow switches, instrument snubbers, nozzles, restricting orifices, sprinkler heads, tubing, valves, flow indicators, housing, diesel fuel storage tank, ductwork, exhaust silencer, expansion tank overflow container, reactor coolant pump oil collection tanks, flame arrestors, heater unit, hydropneumatic tank, lube oil cooler, odorizer, oil mist recovery unit, oil reservoir, pipe, pumps, vacuum limiter, and water manifold component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

However, LRA Table 3.3.2-32, Auxiliary Systems - Unit 3 Fire Protection (page 3-296), for external surfaces of copper alloy valves in an environment of air, did not include the aging effect of loss of material as in Unit 2 Table 3.3.2-31, Auxiliary Systems - Unit 2 Fire Protection (page 3-285). In LRA supplement dated July 7, 2004, the applicant stated that for the Unit 3 fire protection system, as presented in Unit 2 Table 3.3.2-32 (page 3-296), Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy “valves” component group exposed internally to an air environment for Unit 2 LRA, Table 3.3.2-32, Auxiliary Systems - Unit 3 Fire Protection (page 3-296). The aging effect of “loss of material” will be added to this component group. The applicant stated that fire protection program will manage this aging effect. Based on the addition of this aging effect, the staff finds the applicant’s response to be acceptable.

In the LRA, the applicant proposed to manage loss of material of copper alloy filter/strainer component type exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, and copper alloy components exposed internally to an environment of air or gas for CO_2 storage tank, CO_2 tank cooling coils, damper housing, fan/blower housing, ductwork flex hoses and connections, nozzles, odorizers, restricting orifices, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

In the LRA, the applicant proposed to manage loss of material of copper alloy sprinkler heads exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.10, “Fire Protection Program,” which is consistent with GALL AMP XI.M26, “Fire Protection,” and GALL AMP XI.M27, “Fire Water System.” The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the LRA, the applicant proposed to manage loss of material of stainless steel tubing component type exposed internally to an environment of oil using AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of copper alloy and stainless steel tubing and restricting orifices component types exposed internally to oil (fuel oil) using AMP B2.1.12, “Fuel Oil Chemistry.” The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program is consistent with GALL AMP XI.M30, “Fuel Oil Chemistry,” with acceptable exceptions. On the basis of its review, the staff finds the program acceptable for managing the aging effects of loss of material. The effectiveness of the fuel oil chemistry program is verified by MPS AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

During the audit and review, the staff questioned why various portions of the fire protection system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement dated July 7, 2004, the applicant added several components to the fire protection system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system is documented in Section 2.3A.3.32 of this SER.

3.3A.2.3.33 Domestic Water - Aging Management Evaluation - Table 3.3.2-33 and Table 3.3.2-33a

The staff reviewed Table 3.3.2-33 of the LRA, and Table 3.3.2-33a of the applicant’s letter, dated January 11, 2005, which summarized the results of AMR evaluations for the domestic water system component groups.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for stainless steel and PVC components exposed to air, including pipe and valve component types. Air is not identified in the GALL Report as an environment for these components and materials. In addition, in the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for carbon steel components exposed to air, including domestic water hot water tank component types.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for PVC pipe component type in a seawater environment. Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, the staff concurred that there are no aging effects for PVC pipe components in a seawater environment.

3.3A.2.3.34 Diesel Generator - Aging Management Evaluation - Table 3.3.2-34

The staff reviewed LRA Table 3.3.2-34, which summarized the results of AMR evaluations for the diesel generator system component groups. The staff reviewed the technical report that provides the AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy lube oil heat exchangers (shell), lube oil heaters, oil pans, pipe, pumps, turbochargers, valves, filter/strainers, lube oil heat exchangers (tubes), lube oil heat exchangers (tube sheet), tubing, and valve component types exposed internally or externally to an environment of oil using AMP B2.1.25, "Work Control Process." The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of copper-alloy air-cooling heat exchangers (tubes) and jacket-water heat exchangers (tubes) component types exposed to treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, nickel-based alloy, copper alloy, and aluminum components exposed internally and externally to air, including filter/strainers, air cooling heat exchanger (shell), air intercoolers (shell), air start distributors, jacket water expansion tanks, jacket water heat exchangers (shell), lube oil heat exchangers (shell), lube oil heaters, oil pans, pipe, pumps, stand-by jacket coolant heaters, starting air tanks, turbochargers, valves, air cooling heat exchangers (channel), governor hydraulic oil boosters, jacket water heat exchangers (channel), level indicators, lube oil heat exchangers (channel), tubing, expansion joints, and flow orifices component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

The Work Control Process is credited with managing buildup of deposit on copper alloy tubesheets exposed to an oil environment. During its review, the staff determined that additional information concerning aging management for buildup of deposit was needed to complete its review. This request for information is described in RAI 3.3.35-A-1. RAI 3.3.35-A-1, the applicant’s response to this RAI and the staff’s evaluation of the responses are described below.

LRA Table 3.3.2-34 identifies copper alloy tubesheets in the lube oil heat exchangers as susceptible to buildup of deposit in an oil environment. The LRA identifies heat transfer as an intended function for the tube sheet and credits the work control process AMP for managing this aging effect. This AMP identifies the use of lubricating oil analysis to detect contaminants and visual inspections to detect buildup of deposits. In heat exchangers, buildup of deposit (commonly known as fouling) can adversely affect the heat transfer function. The diesel generators are normally only operated for short operational periods and the lubricating oil may not have a chance to reach steady state or worse case conditions during testing. The applicant was requested to clarify if heat exchanger performance tests to recognized industry practices are used to detect fouling in the lube oil heat exchangers or are frequent visual inspections and cleaning required. In the absence of heat exchanger performance testing, the applicant was requested to submit the technical justification that unacceptable buildup of deposit on the tube sheet exposed to lubricating oil would be detected prior to loss of the required heat transfer function.

By letter dated November 9, 2004, the applicant responded by providing the following information:

> The performance of the lube oil heat exchangers is confirmed during emergency diesel generator (EDG) periodic surveillance testing. In accordance with the plant Technical Specifications, the EDGs are operated at a design load for a minimum of 60 minutes each 31 days. This test loading and duration ensures that the diesel engine and its auxiliary systems, including lubricating oil, reach steady state operating conditions for the majority of the testing period, thereby providing sufficient data to evaluate the heat transfer performance of the lube oil heat exchanger,
>
> Buildup of deposit due to fouling in an oil environment is not expected to be significant, but is conservatively assumed in the aging management review for these heat exchangers because of water contamination of the oil. Buildup of deposit is managed by the Work Control Process AMP, which includes the periodic testing of the EDGs. Lube oil temperature is recorded during EDG testing and abnormal readings would initiate an evaluation through the corrective action process to determine the cause of the elevated temperatures. The frequency of the EDG performance tests ensures that fouling would not prevent the intended function of the lube oil heat exchanger. In addition, a review of Millstone operating experience indicates that there has been no instances of fouling of the EDG lube oil heat exchangers affecting the heat transfer intended function,

The staff reviewed the applicant’s response and determined that the response was reasonable and acceptable because the applicant provided sufficient information to conclude that buildup of deposit in the EDG lube oil heat exchangers will be effectively managed by the work control process AMP. This conclusion is based on the applicant’s periodic surveillance testing of the EDGs which records steady state lube oil temperatures to detect fouling.

3.3A.2.3.35 Diesel Generator Fuel Oil - Aging Management Evaluation - Table 3.3.2-35

The staff reviewed LRA Table 3.3.2-35, which summarized the results of AMR evaluations for the diesel generator fuel oil system component groups. The staff reviewed the AMR results report for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of copper alloy, carbon steel, and stainless steel pumps, tubing, valves, and filter/strainers component types exposed internally to fuel oil using AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated in LRA Section 3.3.2.2.7 that AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program.

The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the staff finds the fuel oil chemistry program acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and aluminum components exposed internally and externally to air, including flame arrestors, clean oil storage tanks, diesel oil supply tanks, level indicators, pipe, pumps, valves, filter/strainers, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Moreover, the diesel fuel oil tank is supported on saddle-type steel supports and is not in contact with concrete or soil. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3A.2.3.36 Station Blackout Diesel Generator - Aging Management Evaluation - Table 3.3.2-36

The staff reviewed Table 3.3.2-36 of the LRA, which summarized the results of AMR evaluations for the station blackout (SBO) diesel generator system component groups. The staff reviewed the technical report that provides the AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage cracking of stainless steel expansion tanks, pipe, tubing, and valve component types exposed internally to treated water using AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. As stated above, the staff finds the work control process program acceptable for managing the aging effect of cracking.

In the LRA, the applicant proposed to manage loss of material of stainless steel, carbon steel, and cast iron flow indicators, lube oil coolers (channel), oil sumps, pipe, silencers, pumps, turbo chargers, lube oil coolers (tubes), lube oil coolers (tube sheet), radiators, lubricators, restricting orifices, tubing, and valve component types exposed internally or externally to oil using AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. Also as stated above, the staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of stainless steel fuel heaters, tubing, and valves component types exposed internally to fuel oil using AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated in LRA Section 3.3.2.2.7 that AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the staff finds the fuel oil chemistry program acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant proposed to manage loss of material of stainless steel expansion tanks and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposes to manage loss of material of stainless steel valve component group exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and aluminum components exposed internally and externally to air, including filter/strainers, radiators, aftercoolers, aspirators, flow indicators, fuel heaters, fuel oil day tanks, immersion heaters, injectors, lube oil coolers (channel), lube oil coolers (shell), oil sumps, pipe, silencers, pump, turbochargers, air receivers, expansion joints, lubricators, pulsation dampeners, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. Based on industry research and operating experience, change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air is contingent on radiation levels, ambient temperatures, and exposure to ultraviolet radiation and ozone.

On the basis of its review, the staff concurs with the applicant’s finding that no aging effect for rubber expansion joints in air is applicable, since these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95 °F.

In the LRA, the applicant identified no aging effects for aluminum filter/strainers component types exposed internally to lubricating oil. The technical report of AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum exposed internally to oil. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. During the audit, the applicant stated that the MAER was used as the basis. The staff reviewed the applicant’s MAER and finds that additional information regarding the basis was necessary. The applicant revised its MAER and the technical report of AMR results for the diesel generator and support systems to include the basis. The staff reviewed the basis and finds it acceptable based on the addition of information to the MAER and the technical report. In addition, the applicant stated that, in a lubricating oil environment, significant corrosion is only expected where the water can settle or pool. Due to the differential densities of lubricating oil and water, water will tend to separate and settle in low-flow or stagnant areas where the flow velocity is insufficient to flush the water through the system. Lube oil systems are assumed to be free of water contamination as their initial condition. Lube oil systems are typically closed systems that have little potential for ingress of contaminants unless a component failure occurs. License renewal does not assume component failures as a means to establish the conditions necessary for aging to occur. For example, tube failures in lube oil coolers are not assumed. Therefore, water contamination of lube oil is event-driven, and would be addressed by corrective maintenance. For license renewal purposes, lube oil is therefore assumed to be free of water contamination. On the basis of its review, the staff concurs that there are no applicable aging effects requiring management for aluminum in a fuel oil environment.

In the LRA, the applicant identified no aging effects for aluminum radiators component types exposed externally to atmosphere/weather. The technical report that provides the AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum in an external environment of atmosphere/weather. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. During the audit, the applicant stated that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred.

The staff reviewed the revised technical report and operating experience. On the basis of its review, the staff finds that there are no applicable aging effects requiring management for aluminum in an atmosphere/weather environment.

3.3A.2.3.37 Security - Aging Management Evaluation - Table 3.3.2-37

The staff reviewed LRA Table 3.3.2-37, which summarized the results of AMR evaluations for the security system component groups. The staff reviewed the AMR results report for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of carbon steel, cast iron, and copper alloy coolers (shell), fan/blower housings, heaters, oil pans, pipe, pump, valves, filter\strainers, coolers (tubes), and coolers (tube sheet) component types exposed internally or externally to lubricating oil using AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed internally to fuel oil using AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated in LRA Section 3.3.2.2.7 that AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. The staff finds the fuel oil chemistry program acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds the work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff concluded that the work control process program is acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloy components exposed internally and externally to air, including coolers (channel head), coolers (shell), diesel fuel oil storage tank, fan/blower housings, filter/strainers, heaters, oil pans, pipe, pumps, valves, filter/strainers, tubing, and radiators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for the aluminum radiators component type exposed externally to air. The technical report of AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum in an external environment of air. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated to the staff that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to aluminum in an air environment. St. Lucie Power Plant identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred.

The staff reviewed the revised technical report and operating experience. On the basis of its review, the staff finds that there are no applicable aging effects requiring management for aluminum in an air environment.

3.3A.2.3.38 Clean Liquid Waste Processing - Aging Management Evaluation - Table 3.3.2-38 and Table 3.3.2-38a

The staff reviewed Table 3.3.2-38 of the LRA and Table 3.3.2-38a of the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the clean liquid waste processing system component groups.

In the LRA, the applicant credits AMP B2.1.6, "Chemistry Control Program for Secondary Systems," for managing the loss of material aging effect for the carbon steel degasifier preheater shell component type exposed internally to steam. The applicant stated that the environment is not in the GALL Report for this component type and material. The applicant further stated that the chemistry control for secondary systems program provides reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material and cracking. The program provides an environment that minimizes material degradation, maintains material integrity, and reduces the amount of corrosion product that could interfere with equipment operation and heat transfer. The applicant stated that the chemistry control for secondary systems program is based on EPRI guidelines provided in TR-102134, "PWR Secondary Water Chemistry Guidelines." These guidelines reflect industry operating experience to optimize plant chemistry control.

The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER. The staff finds that this program is consistent with GALL AMP XI.M2 with acceptable exceptions.

On the basis of its review of current industry research, operating experience, and the technical report for AMR results for steam and power conversion systems, the staff finds that the chemistry control for secondary systems program is acceptable for managing loss of material due to general corrosion and crevice corrosion of carbon steel components in steam, since this program provides an environment that minimizes material degradation, maintains material integrity, and reduces the amount of corrosion.

In the LRA, the applicant proposes to manage loss of material of stainless steel primary drain tank and quench cooler tubes and tube sheet component types exposed to treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA and the applicant's supplement, dated January 11, 2005, the applicant proposed to manage loss of material of the stainless steel primary drain tank and equipment drain tank component type exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program is its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the applicant's January 11, 2005 supplement, the applicant proposed to manage loss of material of the stainless steel for the degasifier vent condenser (shell) and the degasifiers exposed to treated water and steam environment using AMP B2.1.5, "Chemistry Control for Primary Systems Program." The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The staff finds that this program is consistent with GALL AMP XI.M2, "Water Chemistry," with an acceptable exception. Since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect, the staff finds this to be acceptable.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for carbon steel and stainless steel components exposed to a sheltered air environment for degasifier effluent cooler shell and degasifier preheater shells, degasifier aftercooler helicoil tubes, flow elements, primary drain tank, and quench tank cooler shell, pipe, primary drain tank, pumps, strainers, tubing, valves, conductivity element, degasifier vent condenser (shell), degasifiers, equipment drain sump tank, flexible hoses and flow indicators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3A.2.3.39 Gaseous Waste Processing - Aging Management Evaluation - Table 3.3.2-39

The staff reviewed LRA Table 3.3.2-39, which summarized the results of AMR evaluations for the gaseous waste processing system component groups.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including after coolers (shell), pipe, valves, and waste gas compressor seal coolers component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposes to manage loss of material of stainless steel after coolers (tubes), after coolers (tube sheet), pipe, and valve component types exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.3A.2.3.40 Post-Accident Sampling - Aging Management Evaluation - Table 3.3.2-40

The staff reviewed LRA Table 3.3.2-40, which summarized the results of AMR evaluations for the post-accident sampling system component groups.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including bolting, flushing accumulators, nitrogen accumulators, filter/strainers, flow elements, pumps, reservoir, sample chambers, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Without the presence of an aggressive environment, no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel flushing accumulators, sample chambers, reservoir, pumps, tubing, and valve component types exposed internally to moisture-laden air and/or an intermittently wetted environment using AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for stainless steel components exposed internally to gas for nitrogen accumulators, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concurs that there are no applicable aging effects requiring management for metal in a gas environment.

3.3A.2.3.41 Station Sumps and Drains - Aging Management Evaluation - Table 3.3.2-41 and Table 3.3.2-41a

The staff reviewed Table 3.3.2-41 of the LRA and Table 3.3.2-41a in the supplement, dated January 11, 2005, which summarized the results of AMR evaluations for the station sumps and drains system component groups.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for copper-alloy, carbon and stainless steel, cast iron, and PVC components exposed to air, including piping, pumps, tubing, valves, collection section tank, flow indicators, and filter component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to a dry air environment. Therefore, the staff concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA and the January 11, 2005, supplement, the applicant proposed to manage loss of material of the copper alloy valve component types and of stainless steel collection section tank component types exposed internally to moisture-laden air and/or an intermittently wetted internal environment using AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA and its letter dated January 11, 2005, the applicant identified no aging effects for PVC material of pipe and filters component type in a raw water environment. Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, the staff concurs that there are no aging effects for PVC material of pipe and filters component types in a raw water environment.

Operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. Since these PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, the staff concurs that there are no aging effects for PVC pipe components in seawater environment.

3.3A.2.3.42 Table 1: Auxiliary Systems - Aerated Liquid Radwaste - Aging Management Evaluation

In the LRA letter of November 9, 2004, the applicant identified no aging effects for stainless steel exposed to air, including conductivity element, flow elements, flow indicator, pipe, pumps, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, stainless steel exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for stainless steel components in an air environment.

3.3A.2.3.43 Table 2: Auxiliary Systems - Solid Waste Processing - Aging Management Evaluation

In the LRA supplement of November 9, 2004, the applicant identified no aging effects for stainless steel exposed to air, including flow indicator, pipe, pumps, spent resin fill head tank, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, stainless steel exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for stainless steel components in an air environment.

3.3A.2.3.44 Table 3: Auxiliary Systems - Turbine Building Closed Cooling Water - Aging Management Evaluation

In the LRA supplement of November 9, 2004, the applicant stated that loss of material of chemical addition tank, flexible hoses, flow elements, flow orifices and tubing of stainless steel exposed to moisture-laden air and/or intermittently wetted environment in the auxiliary system is managed using AMP B.2.1.13, “General Condition Monitoring.” The staff reviewed the general condition monitoring and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

In the LRA supplement of November 9, 2004, the applicant identified no aging effects for copper alloys exposed to gas in for the chiller condensers (tubes) component types. Gas is not identified in the GALL Report as an environment for these components and materials. On the basis of current industry research and operating experience, copper alloys exposed externally to gas are not susceptible to significant general corrosion that would affect the intended function of components.

In the LRA supplement of November 9, 2004, the applicant stated that loss of material of TBCCW heat exchangers (tubes) of copper alloys stainless steel in treated water environment in the auxiliary system is managed using AMP B.2.1.25, “Work Control Process.”

The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the staff finds that the management of cracking for these components is adequate.

3.3A.2.3.45 Table 4: Auxiliary Systems - Water Box Priming - Aging Management Evaluation

In the LRA supplement of November 9, 2004, the applicant identified no aging effects for copper alloys and stainless steel exposed to indoors air environment and are not intermittently wetted for the filler/strainers, flow orifices, flow switches, pipe, and valve component types.

On the basis of current industry research and operating experience, copper alloys and stainless steel exposed externally to indoors air environment and are not intermittently wetted are not susceptible to significant general corrosion that would affect the intended function of components.

All other AMRs in LRA Tables 3.3.2-1 through 3.3.2-41 and LRA supplements were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving combinations of material, environment, AERM, and AMP that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the auxiliary systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the auxiliary systems, as required by 10 CFR 54.21(d).

3.3B Unit 3 Aging Management of Auxiliary Systems

This section of the SER documents the staff's review of the applicant's AMR results for the Unit 3 auxiliary systems components and component groups associated with the following systems:

- circulating water system
- service water system
- sodium hypochlorite system
- reactor plant component cooling system
- turbine plant component cooling water system
- chilled water system
- charging pumps cooling system
- safety injection pumps cooling system
- neutron shield tank cooling system
- containment atmosphere monitoring system
- containment instrument air system
- instrument air system
- nitrogen system
- service air system
- chemical and volume control system
- reactor plant sampling system
- primary grade water system
- auxiliary building ventilation system
- circulating and service water pumphouse ventilation system
- containment air recirculation system
- containment purge air system
- containment leakage monitoring system
- containment vacuum system
- control building ventilation system
- control rod drive mechanism (CRDM) ventilation and cooling system
- emergency generator enclosure ventilation system
- engineered safety features (ESF) building ventilation system
- fuel building ventilation system
- hydrogen recombiner and hydrogen recombiner building HVAC system
- main steam valve building ventilation system
- service building ventilation and air-conditioning system
- station blackout (SBO) diesel generator building ventilation system
- supplementary leak collection-and-release system
- technical support HVAC and filtration systems
- turbine building area ventilation system
- waste disposal building ventilation system
- Unit 2 fire protection system
- Unit 3 fire protection system
- domestic water system
- emergency diesel generator system

- emergency diesel generator fuel oil system
- SBO diesel generator system
- security system
- boron recovery system
- radioactive liquid waste processing system
- radioactive gaseous waste system
- post-accident sampling system
- radioactive solid waste system)
- reactor plant aerated drains system
- reactor plant gaseous drains system
- sanitary water system

3.3B.1 Summary of Technical Information in the Application

In LRA Section 3.3, the applicant provided AMR results for auxiliary systems components and component groups. In LRA Table 3.3.1, “Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems,” the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the auxiliary systems components and component groups.

The applicant’s AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant’s review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.3B.2 Staff Evaluation

The staff reviewed LRA Section 3.3 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the auxilary system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant’s claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff’s evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff’s audit evaluation are documented in the staff’s MPS audit and report and summarized in Section 3.3B.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant’s further evaluations were consistent with the acceptance criteria in Section 3.3.2.2 of NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” dated July 2001. The staff’s audit evaluation are documented in the staff’s MPS audit and report and summarized in Section 3.3B.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not addressed in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and report and summarized in Section 3.3B.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.3B.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the auxiliary system components.

Table 3.3B-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.3 that are addressed in the GALL Report.

Table 3.3B-1 Staff Evaluation for Auxiliary System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in spent fuel pool cooling and cleanup (Item Number 3.3.1-01)	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one time inspection	Not applicable	Not applicable (See Section 3.3B.2.2.1)
Linings in spent fuel cooling and cleanup system; seals and collars in ventilation systems (Item Number 3.3.1-02)	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant-specific	Work control process (B2.1.25); General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.3B.2.2.2)
Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR) (Item Number 3.3.1-03)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 52.21(c)	TLAA	This TLAA is evaluated in Section 4.3B, Metal Fatigue
Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR) (Item Number 3.3.1-04)	Crack initiation and growth due to SCC or cracking	Plant-specific		Consistent with GALL (See Section 3.3B.2.2.4)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components (Item Number 3.3.1-05)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant-specific	General condition monitoring (B2.1.13); Fi re protection program (B2.1.10); Work control process (B2.1.25); Tank inspection program (B2.1.24); Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.5)
Components in reactor coolant pump oil collection system of fire protection (Item Number 3.3.1-06)	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	Tank inspection program (B2.1.24); Work control process (B2.1.25)	Consistent with GALL (See Section 3.3B.2.2.6)
Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system (Item Number 3.3.1-07)	Loss material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Fuel oil chemistry program (B2.1.12); Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.7)
Heat exchangers in chemical and volume control system (Item Number 3.3.1-09)	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and plant-specific verification program	Chemistry control for primary systems program (B2.1.5); Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.9)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1-10)	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant-specific	Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.10)
New fuel rack assembly (Item Number 3.3.1-11)	Loss of material due to general, pitting and, crevice corrosion	Structures monitoring		Not consistent with GALL (See Section 3.5B.2.3.4) The new fuel rack assembly is fabricated from stainless steel. No aging effect management is required for the stainless steel fuel rack assembly.

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Neutron absorbing sheets in spent fuel racks (Item Number 3.3.1-12)	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring		Boraflex neutron absorbing sheets used in the spent fuel storage racks are not credited spent fuel pool criticality analysis. Therefore, the Boraflex sheets perform no intended function.
Spent fuel storage racks and valves in spent fuel pool cooling and cleanup (Item Number 3.3.1-13)	Crack initiation and growth due to stress corrosion cracking	Water chemistry		Not consistent with GALL The spent fuel pool water temperature is maintained below the threshold temperature of 140 degree F for SCC.
Closure bolting and external surfaces of carbon steel and low-alloy steel components (Item Number 3.3.1-14)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3; General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.3B.2.1.1)
Components in or serviced by closed-cycle cooling water system (Item Number 3.3.1-15)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7); Work control process (B2.1.25); Chemistry control for primary systems program (b2.1.5); Chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Cranes, including bridge and trolleys, and rail system in load handling system (Item Number 3.3.1-16)	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	Inspection activities: load handling cranes and devices (B2.1.19)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Components in or serviced by open-cycle cooling water systems (Item Number 3.3.1-17)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Service water system (open-cycle cooling) (B2.1.21); Work control process (B2.1.25); Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1.2)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Buried piping and fittings (Item Number 3.3.1-18)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tank surveillance or Buried piping and tanks inspection	Buried piping inspection (B2.1.4)	Consistent with GALL, which recommends further evaluation (See Section 3.3B.2.2.11)
Components in compressed air system (Item Number 3.3.1-19)	Loss of material due to general and pitting corrosion	Compressed air monitoring	Work control process (B2.1.25); Tank Inspection program (B2.1.24)	Not consistent with GALL (See Section 3.3B.2.3)
Components (doors and barrier penetration seals) in concrete structures in fire protection (Item Number 3.3.1-20)	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	Fire protection program (B2.1.10); Work control process (B2.1.25)	Consistent with GALL (See Section 3.3B.2.1.3)
Components in water-based fire protection (Item Number 3.3.1-21)	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	Fire protection program (B2.1.10); Work control process (B2.1.25) ; Tank inspection program (B2.1.24)	Not consistent with GALL (See Section 3.3B.2.3)
Components in diesel fire system (Item Number 3.3.1-22)	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	Fuel oil chemistry (B2.1.12)	Not consistent with GALL (See Section 3.3B.2.3)
Tanks in diesel fuel oil system (Item Number 3.3.1-23)	Loss of material due to general, pitting, and crevice corrosion	Above ground carbon steel tanks	Tank inspection program (B2.1.24)	Consistent with GALL, which recommends no further evaluation (See Section 3.3B.2.1)
Closure bolting (Item Number 3.3.1-24)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	Bolting integrity	Consistent with GALL (See Section 3.3B.2.1.6)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components (aluminum, bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink (Item Number 3.3.1-29)	Loss of material due to selective leaching	Selective leaching of materials	Work control process (B2.1.25); Buried piping inspection (B2.1.4)	Consistent with GALL (See Section 3.3B.2.1.4)
Fire barriers, walls, ceilings, and floors in fire protection (Item Number 3.3.1-30)	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring		Not consistent with GALL (See Section 3.5B.2.3.37)

The staff's review of the MPS auxiliary systems and associated components followed one of several approaches. One approach, documented in Section 3.3B.2.1, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.3B.2.2, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.3B.2.3, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the auxiliary systems components is documented in Section 3.0.3 of this SER.

3.3B.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

<u>Summary of Technical Information in the Application</u>. In Section 3.3.2.1 of the Unit 3 LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the auxiliary systems components:

- infrequently accessed areas inspection program
- work control process
- service water system (open-cycle cooling)
- closed-cycle cooling water system
- boric acid corrosion
- general condition monitoring
- buried pipe inspection program
- tank inspection program
- chemistry control for primary systems program

- chemistry control for secondary systems program
- inservice inspection program: systems, components, and supports
- fire protection program
- fuel oil chemistry
- bolting integrity program

Staff Evaluation. In Tables 3.3.2-1 through 3.3.2-50 of the Unit 3 LRA, the applicant provided a summary of AMRs for the auxiliary systems components and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.3B.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of LRA Table 3.3.1, Item 3.3.1-14, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, “Boric Acid Corrosion Program,” and MPS AMP B2.1.13, “General Condition Monitoring Program.” The boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The boric acid corrosion program and general condition monitoring program are evaluated in Sections 3.0.3.1 and 3.0.3.3.2 of this SER.

In the Unit 3 LRA, the applicant stated that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. During the audit, the staff asked the applicant for clarification of how loss of material for components not normally visible, or in infrequently accessed areas, is managed by this program. During the audit, further clarification was requested on how identification, documentation, evaluation, and trending of boric acid leakage is performed under this program. During the audit, the applicant stated that the general condition monitoring program is an extension of the boric acid corrosion program in that it identifies borated water leakage during inspections and then, through the corrective action program, the leak is assigned and evaluated by the boric acid corrosion program. When borated water leakage is identified by the general condition monitoring program, a condition report is written to identify the leak. During the daily review of the new condition reports, it is assigned to the boric acid corrosion program where it gets fully evaluated and repaired as required. This is the same process used to identify leaks in the boric acid corrosion program.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the general condition monitoring program. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once every 10 years to verify the integrity of the equipment. There is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment. In addition, the inspection opportunities for these cubicles will probably be more frequent than once every 10 years due to the need to perform corrective maintenance, filter changeout, etc. The Unit 3 areas accessed at least once per refueling interval are typically observed by operations personnel during tagouts, health physics during general area surveys or a survey performed for upcoming work in the area, or during containment walkdowns as part of the boric acid corrosion program.

The staff's evaluation of the general condition monitoring program is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns by plant personnel to detect boron buildup and/or boric acid leaks.

3.3B.2.1.2 Loss of Material Due to General, Pitting, and Galvanic Corrosion, MIC, and Biofouling; Buildup of Deposits Due to Biofouling

In the discussion section of LRA Table 3.3.1, Item 3.3.1-17, the applicant stated that loss of material for components in an open-cycle cooling water environment is managed by MPS AMP B2.1.21, "Service Water System (Open-Cycle Cooling) Program." However, Item 3.3.1-17 does not address buildup of deposits in a seawater environment for the heat exchanger tubes and lined piping as an aging effect managed by the service water program. In LRA supplement dated July 7, 2004, the applicant stated that Unit 3 LRA Table 3.3.1, Item 3.3.1-17 (page 3-210), the first sentence in the discussion should include "and Buildup of Deposits" after "Loss of Material." The staff reviewed the applicant's response and finds that response is acceptable.

In an LRA supplement dated November 9, 2004, the applicant added the groundwater underdrains storage tank to the scope of license renewal and performed an aging management review. The applicant stated that loss of material of stainless steel is managed using MPS AMP B2.1.24, "Tank Inspection Program." The applicant also stated that visual inspections are performed that look for loss of material (e.g., pitting, MIC, etc). Because the subject tank is fully accessible from underneath (i.e., it is not resting on the ground or concrete), volumetric inspection is not necessary. The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds that the tank inspection is acceptable for managing this aging effect.

3.3B.2.1.3 Loss of Material Due to Wear, Hardening and Shrinkage Due to Weathering

In the discussion section of LRA Table 3.3.1, Item 3.3.1-20, the applicant stated that loss of material due to wear is not an applicable aging effect for components (doors and barrier penetration seals) in the fire protection system. Fire doors could see wear on hinges, locks, etc., due to periodic opening and closing. This could cause loss of material and impact on the intended function of fire doors. During the audit and review, the staff asked the applicant to provide justification as to why this aging effect was not included. The applicant stated that fire doors are passive features to seal passageways through fire-rated barriers. Fire doors are equipped with hardware and attachment/closure devices that perform their intended function with moving parts and/or change of configuration, and are considered to be active components. As such, wear of the hardware, appurtenances, and attachment/closure mechanisms is not considered to be an aging effect, but rather a consequence of frequent or rough usage. The applicant restated that the conclusions in the Unit 3 LRA remain valid and unchanged. However, the applicant initiated revisions to the Unit 3 technical report for miscellaneous structural commodities to incorporate, in Section 2.0 of this SER, the above evaluation for wear of the hinges and locks for the fire doors. On the basis of its review, the staff finds the applicant's response to be acceptable.

3.3B.2.1.4 Loss of Material Due to Selective Leaching

In the discussion section of LRA Table 3.3.1, Item 3.3.1-29, the applicant stated that loss of material due to selective leaching is managed using MPS AMP B2.1.25, “Work Control Process,” and MPS AMP B2.1.4, “Buried Pipe Inspection Program.” The applicant stated that these two programs are not consistent with GALL AMP XI.M33, “Selective Leaching of Materials,” in that the GALL Report recommends a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of materials due to selective leaching is occurring and whether the process will affect the ability of the components to perform their intended function for the period of extended operation. However, the work control process program and the buried pipe inspection program perform only routine visual inspections (which is more than a one-time inspection) when the opportunity arises, but do not perform hardness testing. The staff reviewed the work control process program and the buried pipe inspection program and its evaluation is documented in Sections 3.0.3.3.4 and 3.0.3.2.1 of this SER, respectively.

Since selective leaching generally does not cause changes in dimension and is difficult to detect by visual inspection alone, the staff asked the applicant to justify the use of visual inspection only, or provide other means of detection (Brinnell hardness, destructive testing) or other mechanical means (scraping, chipping, etc.).

In the Unit 3 technical report for the work control process, the applicant stated that selective leaching is an aging mechanism that causes an aging effect of change in material properties. However, in Unit 3 technical report for closed water system AMR, the applicant stated that selective leaching is an aging mechanism under the aging effect of loss of material. Unit 3 technical report for the closed water system AMR also references the Unit 3 technical report for the material aging effect report, which considers selective leaching under loss of material. The staff noted there is a discrepancy as to how selective leaching is considered between the AMP and the AMR technical reports.

During the audit and review, the applicant was requested to provide a rationale for considering selective leaching as causing change in material properties, which is generally an aging effect associated with non-metallic, elastomer type materials. The applicant concurred that the technical report for the work control process should have associated selective leaching with the aging effect of loss of material. The staff reviewed the change document to the technical report for the work control process, which identifies the change to include selective leaching under the “loss of material” aging effect. On the basis of its review, the staff finds this to be acceptable.

During the audit and review, the staff also noted that there was an error in the line item for cast iron and copper alloys in LRA Table 3.3.2-37 (pages 3-341 to 3-352) Unit 3 fire protection system. It appeared that the applicant may have intended to reference Table 3.3.1, Item 3.3.1-29 for selective leaching instead of referencing Table 3.3.1, Item 3.3.1-21. Unit 2 has referenced this correctly. Also, the GALL Report item should be VII.C.1.2-a, similar to that referenced in the Millstone LRA.

In an LRA supplement dated July 7, 2004, the applicant stated that the Unit 3 LRA Table 3.3.2-37 (pages 3-341 to 3-352) should state, “3.3.1-29” for the second Table 1 Item listed for components with cast iron/raw water and copper alloy/raw water material/environment combinations. The NUREG-1801 Volume 2 Item column for the affected component groups should be “VII.C1.2-a” except for the “Pipe” and “Tubing” component groups, which should be “VII.C1.1-a.” The staff reviewed the applicant’s response and finds that it is acceptable.

3.3B.2.1.5 Loss of Fracture Toughness Due to Thermal Aging Embrittlement

The applicant identified, in LRA Table 3.3.2-15 (page 3-268), for the CVCS, loss of fracture toughness as an aging effect for stainless steel regenerative heat exchanger (page 3-268) and valves (page 3-275). The staff noted that loss of fracture toughness is an aging effect normally associated with CASS material. During the audit and review, the applicant was requested to clarify the material. In LRA supplement dated July 7, 2004, the applicant stated that the material listed for the regenerative heat exchanger (channel head) and regenerative channel head (shell) in Unit 3 LRA Table 3.3.2-15 should be “stainless steel (CASS)” rather than just “stainless steel.” The staff reviewed the applicant’s response and finds it acceptable.

During the audit and review, the staff also questioned why various portions of the fire protection system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement letter July 7, 2004, the applicant added several components to the fire protection system list of components that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system is documented in Section 3.0.3.2.7 of this SER.

3.3B.2.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and Stress Corrosion Cracking

In LRA Table 3.3.1, Item 3.3.1-24, the applicant stated that bolting in the auxiliary systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in auxiliary systems is not identified as an AERM.

The staff noted that SRP-LR Table 3.3-1 recommended GALL AMP XI.M18, “Bolting Integrity,” for managing closure bolting in high pressure or high temperature system for loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC.

The staff questioned the applicant whether all the resolution of generic safety issue for bolting, as stated in NUREG-1339, are addressed. By letter dated December 3, 2004, the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addressed degradation of bolting at MPS. The bolting integrity program is reviewed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the “Discussion” column of Unit 3 LRA Table 3.3.1, Item 24 with “consistent with the NUREG-1801.”

The staff reviewed the applicant’s response and finds this acceptable since it is consistent with the GALL Report.

On the basis of its audit and review, the staff determined that for all other AMRs not requiring further evaluation, as identified in the Unit 3 LRA Table 3.3.1 (Table 1), the applicant's references to the GALL Report are acceptable and no further staff review is required.

Staff RAIs Pertaining to Recent Operating Experience and Emerging Issues. Because the GALL Report and SRP-LR were issued in July 2001, these documents do not reflect the most current recommendations for managing certain aging effects that have been the subject of recent operating experience or the topic of an emerging issue. As a result, the staff issued an RAI to determine how the applicant proposed to address these items for license renewal. The applicant's response to this RAI, and the staff's evaluations of the response, is documented as follows.

Boric Acid Corrosion (RAI 3.3-B-1). The LRA identified a borated water leakage environment for various mechanical components in auxiliary systems. Both the boric acid corrosion program and general condition monitoring program are credited with managing loss of material from external surfaces of these components. The LRA stated that the general condition monitoring program is performed in accessible plant areas. The applicant was requested to clarify how loss of material is managed for auxiliary system components not normally visible, such as under insulation or in normally inaccessible areas. In addition, the LRA states that the boric acid corrosion program is consistent with GALL AMP XI.M10. The scope of GALL AMP XI.M10 is limited to components in the vicinity of the reactor coolant pressure boundary. However, it appears that the MPS boric acid corrosion program is credited with managing loss of material caused by borated water leakage in systems that may not be in the vicinity of the reactor coolant pressure boundary, such as the radwaste area ventilation system. The applicant was requested to clarify this potential discrepancy. If the scope of the MPS boric acid corrosion program is different from the GALL XI.M10 program, the applicant was requested to revise the MPS program description accordingly in the AMP and FSAR supplement. Also the applicant was requested to identify the basis for applying the boric acid corrosion program to manage boric acid corrosion in copper alloy and cast iron materials that are not addressed in GALL AMP XI.M10 and may require a different inspection frequency.

By letter dated December 3 2004, the applicant responded as follows:

In a response dated December 3, 2004, the applicant clarified that general equipment (or materials) inspections are performed as often as daily. The applicant indicated that an independent assessment was performed by INPO in August 2003 and boric acid leaks are captured in the station corrective action program. INPO noted that the computer based training module has increased awareness of station employees with regard to boric acid corrosion and minor program enhancements are being addressed through the corrective action program.

The applicant stated that the following clarification will be added to Section A2.1.2, Boric Acid Corrosion Program, of the Unit 3 LRA:

> The boric acid corrosion program provides both detection and analysis of leakage of borated water inside containment. The general condition monitoring program is the primary method for detecting borated water leakage outside containment. The analysis of the leakage is performed through the boric acid corrosion program. Any necessary corrective actions are implemented through the corrective action program.

The staff reviewed the applicant’s response and determined that the response was reasonable and acceptable because the applicant credits a combination of the general condition monitoring program and the boric acid corrosion program to detect and evaluate borated water leakage and boric acid corrosion to maintain the intended function of the auxiliary system components. For areas outside containment, general equipment (or materials) frequent inspections are performed as often as daily, which would identify any borated water leakage and any required subsequent evaluation. The applicant has agreed to include a clarification in the FSAR supplement to indicate that the general condition monitoring program is the primary method for detecting borated water leakage outside containment and the analysis of the leakage is performed through the boric acid corrosion program with corrective actions implemented through the corrective action program.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.3.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further project team review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In LRA Section 3.3.2.2, the applicant provides further evaluation of aging management as recommended by the GALL Report for auxiliary systems. The applicant provided information concerning how it will manage the following aging effects:

- loss of material due to general, pitting, and crevice corrosion
- hardening and cracking or loss of strength due to elastomer degradation or loss of material due to wear
- cumulative fatigue damage
- crack initiation and growth due to cracking or stress corrosion cracking
- loss of material due to general, microbiologically influenced, pitting, and crevice corrosion
- loss of material due to general, galvanic, pitting, and crevice corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion and biofouling
- quality assurance for aging management of non-safety-related components
- crack initiation and growth due to stress corrosion cracking and cyclic loading

- reduction of neutron-absorbing capacity and loss of material due to general corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.3B.2.2 of the Standard Review Plan for License Renewal. Details of the staff's audit and review are documented in the staff's audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.3B.2.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion

In LRA Section 3.3.2.2.1, the applicant addressed loss of material in components of the spent fuel pool system.

SRP-LR Section 3.3.2.2.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tube sheets of the heat exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from general, pitting, or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of selected components at susceptible locations is an acceptable method for ensuring that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Further, SRP-LR Section 3.3.2.2.1 states that loss of material due to pitting and crevice corrosion could occur in the filter housing, valve bodies, and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI TR-105714 guidelines for primary water chemistry and TR-102134 for secondary water chemistry to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMP recommended by the GALL Report is GALL AMP XI.M2, “Water Chemistry,” for management of loss of material due to general, pitting, and crevice corrosion.

The applicant stated in the LRA that as set forth in the GALL Report, this item applies to spent fuel pool cooling and cleanup carbon steel components with elastomer linings. The spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, the applicant concluded that this item is not applicable. The applicant has included the spent fuel pool cooling system in Unit 3 LRA Section 3.2, “Engineered Safety Features Systems.” The staff reviewed Unit 3 LRA Table 3.2.2-5, AMR for spent fuel pool cooling system, and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the staff finds this line item is not applicable for components in the Unit 3 spent fuel pool cooling system.

However, these components are fabricated from stainless steel material. As stated in Section 3.2B.2.3.5 of this SER, the applicant proposed to manage loss of material of stainless steel expansion joints, flow elements, pipe, pumps, and spent fuel pool heat exchangers (channel head) component types exposed to chemically treated borated water using only MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an exception. The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. The staff finds that because the effects of pitting and crevice corrosion on stainless steel components are not significant in chemically treated borated water, inspection of selected components to verify the absence of loss of material is not required. On the basis of its review, the staff finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

3.3B.2.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear

In LRA Section 3.3.2.2.2, the applicant addressed the potential for degradation of elastomers in collars and seals in spent fuel cooling systems and ventilation systems.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA that the spent fuel pool cooling system does not contain carbon steel components with elastomer linings. Therefore, this item is not applicable. The applicant has included the spent fuel pool cooling system in LRA Section 3.2, “Engineered Safety Features Systems.” The staff reviewed Table 3.2.2-5, AMR for spent fuel pool cooling system, and verified that the system did not contain carbon steel components with elastomer linings. On the basis of its review, the staff agrees that this line item is not applicable for components in the Unit 3 spent fuel pool cooling system.

The applicant also stated in the LRA that elastomers are used in ventilation system components and are evaluated for cracking and change of material properties due to thermal and radiation exposure. The applicant credited MPS AMP B2.1.25, “Work Control Process,” and MPS AMP B2.1.13, “General Condition Monitoring Program,” for managing age-related degradation of elastomers used in ventilation system components. Also, this program provides input to the corrective action program if aging effects are identified. The staff accepted the work control process program for managing the aging effects of cracking and change in material properties and its evaluation of this program is documented in Section 3.0.3.3.4 of this SER. The staff also accepted the general condition monitoring program for managing cracking and change of material properties since visual inspections will be performed on external surfaces to detect any sign of aging degradation. The staff’s evaluation of the general condition monitoring program is documented in Section 3.0.3.3.2 of this SER.

In LRA Section 3.3.2.2.2, the applicant stated that loss of material due to wear is not an AERM for the elastomers in the ventilation systems. During the audit and review, the staff requested further clarification concerning the applicant’s assertion. The rationale offered by the applicant was that the elastomers in the ventilation systems are not subject to motions which could result in wear. The staff finds that the applicant’s justification is acceptable.

3.3B.2.2.3 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff’s review of the applicant’s evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.3B.2.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking

The staff reviewed LRA Section 3.3.2.2.4 against the criteria in SRP-LR Section 3.3.2.2.4. In LRA Section 3.3.2.2.4, the applicant addressed the potential for cracking in the high-pressure pumps of the chemical and volume control system.

SRP-LR Section 3.3.2.2.4 addresses crack initiation and growth due to cracking in the high-pressure pump in the CVCS. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA that cracking is not identified as an AERM for the CVCS high-pressure pump casing. The high-pressure pump casing is constructed of stainless steel and operates at temperatures less than 140 °F. SCC is applicable to stainless steel components in aqueous environments that experience operating temperatures greater than 140 °F.

The applicant stated that based on industry experience, a temperature criterion of greater than 140 °F is used as the threshold for susceptibility of austenitic stainless steel to SCC. No instances were identified that would bring this temperature threshold into question. On the basis of its review, the staff finds the applicant’s statement reasonable and acceptable because the applicant's bases for excluding the aging effects of cracking in the Unit 3 CVCS high-pressure pump casing are consistent with industry and site operating experience.

3.3B.2.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

In LRA Section 3.3.2.2.5, the applicant addressed the loss of material from corrosion that could occur on internal and external surfaces of components exposed to air and the associated range of atmospheric conditions.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, in the piping of the diesel generator building ventilation system, in the above-ground piping and fittings, valves, and pumps in the diesel fuel oil system and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the EDG system. Loss of material due to general, pitting, crevice, and MIC could occur in the duct fittings, access doors, and closure bolts, equipment frames and housing of the duct; loss of material due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler heating/cooling; and loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including bolting exposed to operating temperatures less than 212°F in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated that MPS AMP B2.1.10, "Fire Protection Program;" MPS AMP B2.1.24, "Tank Inspection Program;" and MPS AMP B2.1.25, "Work Control Process," manage loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components. Loss of material for external surfaces of carbon steel components is managed by MPS AMP B2.1.13, "General Condition Monitoring Program;" MPS AMP B2.1.10, "Fire Protection Program;" MPS AMP B2.1.23, "Structures Monitoring Program;" and MPS AMP B2.1.24, "Tank Inspection Program." MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," manages this aging effect for components in infrequently accessed areas.

The staff identified a discrepancy between LRA Table 3.3.2-36: Auxiliary Systems - Unit 2 Fire Protection and LRA Table 3.3.2-37: Auxiliary Systems - Unit 3 Fire Protection. In LRA Table 3.3.2-36 (page 3-334), the applicant stated, for carbon steel pipe exposed to internally moist air, that the fire protection program is used to manage the aging effects of loss of material. In LRA Table 3.3.2-37 (page 3-346), the applicant credited the work control process program to manage loss of material and references LRA Table 3.3.1, Item 3.3.1-05. During the audit and review, the staff requested the applicant to clarify which is appropriate for managing the aging effect of loss of material. In an LRA supplement dated July 7, 2004, the applicant stated that for LRA Table 3.3.2-37 (page 3-346), the "Work Control Process" AMP for the carbon steel "Pipe" group exposed internally to an air environment should be the "Fire Protection Program" AMP. The "NUREG-1801" item should be "VII.H2.3-a" and the "Notes" should be "C, 2." The staff reviewed the applicant's response and finds it to be acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds the work control process program to be acceptable for managing the aging effects of loss of material due to general corrosion, MIC, pitting, and crevice corrosion for the internal surfaces of ducts, piping, filter housings, compressed air systems components, and fuel oil systems components.

The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The fire protection program is consistent with GALL AMPs XI.M.26, “Fire Protection,” and XI.M.27, “Fire Water System.” On the basis of its review, the staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation when the system is opened for maintenance and/or repair.

The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. The tank inspection program is consistent with GALL AMP XI.M.29, “Aboveground Carbon Steel Tanks.” On the basis of its review, the staff finds that the tank Inspection program is acceptable for managing loss of material due to general corrosion since wall thickness measurements will be performed on the lower portion of the tank.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program performs visual inspections to detect evidence of degradation or adverse conditions in accessible plant areas. System engineers perform comprehensive visual inspections during walkdowns of plant systems and components during normal operation and during refueling outages; plant equipment operators perform equipment and structures inspections twice a day to maintain awareness of system and plant operation and material condition during normal operation and refueling outages. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of materials since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The structures monitoring program manages the aging effects of cracking, loss of material, and change of material properties by monitoring structures and structural support systems that are within the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 pursuant to guidance contained in RG 1.160, Revision 2, and NUMARC 93-01, Revision 2. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures within the scope of license renewal (such as non-safety-related buildings and enclosures, duct banks, valve pits and trenches, high-energy line break barriers, and flood gates) are also monitored to ensure there is no loss of intended function. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. On the basis of its review, the staff finds that the structures monitoring program is acceptable for managing loss of materials since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The staff reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The infrequently accessed areas inspection program is a new, plant-specific program that manages the aging effects of loss of material using visual inspections of the external surfaces of SCs. The program encompasses infrequently accessed areas of the plant which contain in-scope equipment. All areas not normally accessible for inspection and evaluation, and that contain SCs subject to aging management, have been identified for inclusion in the program. On the basis of its review, the staff finds that the infrequently accessed areas inspection program is acceptable for managing loss of material due to general corrosion on external surfaces of carbon steel components, since visual inspections will be performed on external surfaces to detect any sign of aging degradation in the service water system.

During the audit and review, the staff questioned why various portions of the diesel generator system were not included within the scope of license renewal and subject to an AMR. In its response dated July 7, 2004, the applicant added several components to the diesel generator system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the diesel generator system AMR for components addressed by LRA Section 3.3.2.2.5. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the diesel generator system is documented in Section 2.3A.3.34 of this SER.

3.3B.2.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion

In LRA Section 3.3.2.2.6, the applicant addressed further evaluation of programs to manage loss of material in the reactor coolant pump (RCP) oil collection system to verify the effectiveness of the fire protection program.

SRP-LR Section 3.3.2.2.6 states that loss of material due to general, galvanic, pitting, and crevice corrosion could occur in tanks, piping, valve bodies, and tubing in the RCP oil collection system in fire protection. The fire protection program relies on a combination of visual and volumetric examinations in accordance with the guidelines of 10 CFR Part 50, Appendix R and Branch Technical Position 9.5-1 to manage loss of material from corrosion. However, corrosion may occur at locations where water from washdowns may accumulate. Therefore, verification of the effectiveness of the program should be performed to ensure that corrosion is not occurring.

The GALL Report recommends further evaluation of programs to manage loss of material due to general, galvanic, pitting, and crevice corrosion to verify the effectiveness of the program. A one-time inspection of the bottom half of the interior surface of the tank of the RCP oil collection system is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation. This would be provided by a program consistent with GALL AMP XI.M32, "One-Time Inspection."

The applicant stated in the LRA that loss of material is managed for the components associated with the RCP oil collection system by MPS AMP B2.1.24, “Tank Inspection Program,” which subjects the RCP oil collection tanks to periodic internal and external inspections. Additionally, during containment close-out activities, the RCP oil collection tanks are visually inspected and verified to be empty.

The staff reviewed the tank inspection program, which is consistent with GALL AMP XI.29, “Aboveground Carbon Steel Tanks,” and its evaluation is documented in Section 3.0.3.2.17 of this SER. Since the tank inspection program includes volumetric examination for wall thickness measurement of the RCP oil collection tank, the staff finds the program acceptable for managing loss of material due to general, galvanic, pitting, and crevice corrosion.

The applicant referenced LRA Table 3.3.1, Item 3.3.1-06 (page 3-205), for components exposed internally to lube oil (Note 14) and loss of material aging effect combination in LRA Table 3.3.2-36, and credits the work control process program. In the discussion of Item 3.3.1-06, the applicant stated that the loss of material is managed by the tank inspection program. The staff noted that there is no mention of the work control process program in the discussion. In an LRA supplement dated July 7, 2004, the applicant stated that LRA Table 3.3.1, Item 3.3.1-06, should include the following words between the second and third sentences:

> For the non-tank components, loss of material is managed by the work control process.

Additionally, LRA Section 3.3.2.2.6 (page 3-198) should include the following words at the end of the first sentence:

> For the non-tank components, loss of material is managed by the work control process.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for managing the aging effect of loss of material.

3.3B.2.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

In LRA Section 3.3.2.2.7, the applicant addressed further evaluation of programs to manage loss of material in the diesel fuel oil system to verify the effectiveness of the diesel fuel monitoring program.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the tanks of the diesel fuel oil system in the EDG system. The existing AMP relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709, and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The GALL Report recommends programs consistent with “Fuel Oil Chemistry” (XI.M30) and “One Time Inspection” (XI.M32) for management of this aging effect.

The applicant stated in the LRA that MPS AMP B2.1.12, “Fuel Oil Chemistry,” manages loss of material for diesel fuel oil tanks and other components in the diesel generator fuel oil system, the security system, and the SBO diesel generator system. In lieu of a one-time inspection as described in SRP-LR Section 3.3.2.2.7, the applicant stated in LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program, and that tank inspections performed under the applicant’s MPS AMP B2.1.24, “Tank Inspection Program,” provide additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction, and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the staff finds the fuel oil chemistry program to be acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that the work control process program is acceptable for use to provide confirmation of the effectiveness of the fuel oil chemistry program.

The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. The tank inspection program is consistent with GALL AMP XI.M29, “Aboveground Carbon Steel Tanks.” On the basis of its review, the staff finds that the tank inspection program is acceptable for providing additional confirmation that the fuel oil chemistry program is effective for managing aging effects for applicable tanks.

3.3B.2.2.8 Quality Assurance for Aging Management of Non-safety-related Components

Section 3.0.4 of this SER provides a separate evaluation of the applicant’s quality assurance program.

3.3B.2.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading

In LRA Section 3.3.2.2.9, the applicant addressed further evaluation of programs to manage cracking in the chemical and volume control system to verify the effectiveness of the water chemistry control program.

SRP-LR Section 3.3.2.2.9 states that crack initiation and growth due to SCC and cyclic loading could occur in the channel head and access cover, tubesheet, tubes, shell and access cover, and closure bolting of the regenerative heat exchanger and in the channel head and access cover, tubesheet, and tubes of the letdown heat exchanger in the chemical and volume control system. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines of EPRI TR-105714, “PWR Primary Water Chemistry Guidelines: Revision 4,” to manage the effects of crack initiation and growth due to SCC and cyclic loading. Verification of the effectiveness of the chemistry control program should be performed to ensure that crack initiation and growth are not occurring. The GALL Report recommends further evaluation to manage crack initiation and growth from SCC and cyclic loading for these systems to verify the effectiveness of the water chemistry program. A one-time inspection of selected components and susceptible locations is an acceptable method to ensure that crack initiation and growth are not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are “Water Chemistry” (X1.M2) and a plant-specific verification program for management of this aging effect.

The GALL Report recommends that the water chemistry program be augmented by verifying the absence of cracking due to SCC and cyclic loading, or loss of material due to pitting and crevice corrosion. The GALL Report states that an acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.

The applicant stated in the LRA that cracking due to SCC for the regenerative and letdown heat exchangers is managed by MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” Verification of the effectiveness of the chemistry control program is provided by MPS AMP B2.1.25, “Work Control Process.” The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for primary systems program.

The staff reviewed the chemistry control for the primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff notes that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of crack initiation and growth. On the basis of it review, the staff finds that the work control process program is acceptable for managing crack initiation and growth since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.3B.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion

In LRA Section 3.3.2.2.10, the applicant addressed reduction of neutron-absorbing capacity and loss of material due to general corrosion, which could occur in the neutron absorbing sheets of the spent fuel storage rack in the spent fuel storage system.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

The applicant stated in the LRA that the neutron absorber elements credited in the criticality analysis for the spent fuel pool are constructed of Boral. Boral is a thermal neutron poison composed of boron carbide and 1100 alloy aluminum. Boron carbide is a compound having a high boron content in a physically stable and chemically inert form. The neutron-absorbing central layer of Boral is clad with aluminum. The boron carbide and aluminum materials in Boral are unaffected by long-term exposure to radiation.

The applicant stated in the LRA that the Boral has shown no signs of degradation in neutron-absorbing capability. The applicant concluded, based on the design of the neutron absorber elements and the results of surveillance testing, that reduction of neutron-absorbing capacity is not an aging effect that requires management for Boral in the spent fuel pool. On the basis of its review, the staff concurs with the applicant’s conclusion that there are no applicable aging effects requiring management for the Boral in the spent fuel pool.

In the LRA, the applicant stated that the aluminum cladding of the neutron absorber elements is not subject to general corrosion in the spent fuel pool environment. However, the applicant stated that pitting corrosion could occur if spent fuel pool water chemistry exceeded specific contaminant levels. The applicant stated, for the neutron absorber elements, loss of material is managed by maintaining the quality of the spent fuel pool water chemistry. The applicant credited MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program,” for this purpose. The staff reviewed the chemistry control for primary systems program, with exception, and its evaluation is documented in Section 3.0.3.2.2 of this SER. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds that the chemistry control for primary systems program is acceptable for managing this aging effect.

3.3B.2.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

In LRA Section 3.3.2.2.11, the applicant addressed the potential for loss of material in buried piping of the SW and diesel fuel oil systems.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (SW system) and in the diesel fuel oil system. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

The AMP recommended by the GALL Report is the GALL AMP XI.M34, "Buried Piping and Tanks Inspection," for management of this aging effect.

The applicant stated in the LRA that loss of material for buried piping and valves in the service water system, and in the Unit 2 fire protection system, Unit 3 fire protection system, and enclosure building filtration system, is managed by MPS AMP B2.1.4, “Buried Pipe Inspection Program.”

In the LRA, the applicant stated that as part of the buried pipe inspection program a baseline inspection of representative in-scope buried piping is performed, which provides an effective method for detection of aging effects. In addition, inspections are performed when the buried components are excavated for maintenance or any other reason, which provides an effective method to evaluate the condition of the buried piping and protective coatings. Operating experience with age-related degradation of buried piping is limited, and no failures of in-scope buried piping have been identified. The applicant stated that there is no buried piping in the diesel fuel oil systems.

The staff reviewed the buried pipe inspection program and its evaluation is documented in Section 3.0.3.2.1 of this SER. The staff finds that the buried pipe inspection program, which is consistent with GALL AMP XI.M28, “Buried Piping and Tanks Surveillance,” and GALL AMP XI.M34, “Buried Piping and Tanks Inspection,” with exceptions and enhancements, to be acceptable. The staff also finds the exceptions and enhancements to be acceptable. The staff reviewed the plant operating experience and found that the program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of buried pipe. On the basis of its review, the staff finds that the buried pipe inspection program is acceptable for managing the aging effect of loss of material in buried piping and fittings.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In LRA Tables 3.3.2-1 through 3.3.2-50, the staff reviewed additional details of the results of the AMRs for material, environment, AERM, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report. The staff also reviewed additional systems and components, provided in the applicant’s letter, dated January 11, 2005.

In LRA Tables 3.3.2-1 through 3.3.2-50, the applicant indicated, via Note F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect require management will be managed.

Staff Evaluation. For component type material/environment combinations not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff requested the applicant to provide additional information on the issues described in the following general RAI.

Selective Leaching in Copper Alloys (RAI 3.3-B-2)

LRA Tables 3.3.2-2, 3.3.2-12, 3.3.2-15 and 3.3.2-41 for the service water, instrument air, CVCS and SBO diesel generator systems respectively identify loss of material as an aging effect applicable to nickel-based and copper alloys exposed to an atmosphere/weather and treated water environments. The LRA did not identify the alloy zinc content for these materials. The LRA credits the general condition monitoring program for managing loss of material on the exterior of various nickel-based or copper alloy materials and the work control process for managing loss of material in the interior of copper alloy tubes and tubesheets. These AMPs primarily rely on visual inspections. Industry documents, such as EPRI report 1003056, “Non-Class-1 Mechanical Implementation Guideline and Mechanical Tools,” Rev. 3, identify various corrosion mechanisms, including selective leaching, causing loss of material in copper alloys with greater than 15 percent zinc content in a treated water environment or an air environment subject to moisture. Loss of material from selective leaching is specifically addressed in GALL AMP XI.M33, but page B-7 of the LRA states that the aging management reviews did not identify the need for this aging management program. The applicant was requested to identify the alloy zinc content for these materials and clarify if selective leaching is an applicable aging mechanism. If selective leaching is an applicable aging mechanism, the applicant was requested to clarify if hardness measurement and one-time inspection required by GALL AMP XI.M33 will be used to manage the aging effect.

By letter dated November 9, 2004, the applicant responded as follows:

> Dominion conservatively assumed that all copper alloys were of a material composition that could be susceptible to selective leaching. Accordingly, the zinc content for copper alloys was not identified in the LRA since it was not used as an input to the evaluation of aging mechanisms. Selective leaching was not considered to be an applicable aging mechanism for nickel-based alloys.
>
> Selective leaching of copper alloy components in the instrument air and station blackout diesel generator systems was not considered to be significant in an atmosphere/weather environment since this environment only involves periodic wetting of surfaces due to precipitation. Generally, surfaces would dry out and remain dry the majority of the time. If water collection or pooling from precipitation was present for a component, the component material was evaluated with a raw water environment as defined in LRA Table 3.0-1. However, loss of material due to general corrosion was conservatively

identified as an aging effect for these components and the General Condition Monitoring AMP provides overall management of this aging effect.

Selective leaching of copper alloy components in the instrument air, station blackout and, CVCS systems that are subjected to a treated water environment has been re-evaluated and considered to be an applicable aging mechanism. Although the treated water is adjusted to specifically control corrosion by the reduction of oxygen and/or the addition of corrosion inhibitor compounds, there us potential for selective leaching of susceptible materials in this environment. Management of loss of material due to selective leaching of copper alloy components in a treated water environment is performed by the Work Control Process AMP. Specific inspections for selective leaching by the Work Control Process are addressed in Audit Item #85 in the Dominion letter to the NRC staff dated July 7, 2004, (Serial No. 04-320).

No copper alloy components in the service water system are associated with a treated water or atmosphere/weather environment.

The staff reviewed the applicant's response and determined that the response was reasonable and acceptable because the applicant provided sufficient information to evaluate selective leaching in copper alloy components in auxiliary system components. The applicant re-evaluated selective leaching of copper alloys in a treated water environment and concluded that this is an aging mechanism. The applicant has agreed in its letter dated July 7, 2004, to include appropriate inspection criteria for selective leaching to its work control process AMP. The applicant also provided a reasonable basis to conclude that selective leaching is not a significant aging mechanism causing loss of material in copper alloy materials in auxiliary systems exposed to periodic moisture. This conclusion is in part based on the applicant's clarified environmental conditions that copper alloy components in systems exposed to atmosphere/weather conditions are not exposed to wetted conditions for a significant period of time. The staff agrees that selective leaching of nickel alloys is not considered to be a concern in this environment. On the basis of the applicant's response, all issues related to RAI 3.3-B-2 are resolved.

The system-specific staff evaluation is discussed below.

3.3B.2.3.1 Circulating Water - Aging Management Evaluation - Table 3.3.2-1

The staff reviewed LRA Table 3.3.2-1, which summarized the results of AMR evaluations for the circulating water system component groups.

In the LRA, the applicant identified no aging effects for fiberglass pipe component types exposed to air. The applicant stated, in its technical report for open water, that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explained that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism. In addition, a review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems. The staff reviewed the technical report, current industry research and operating experience. On the basis of its review, the staff concludes that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

In the LRA, the applicant identified no aging effects for fiberglass pipe component types exposed to seawater. The applicant stated, its technical report for open water, that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect. The staff reviewed the technical report, current industry research and operating experience and finds that fiberglass components in seawater environment are not exposed to high level of ultraviolet radiation or ozone. On the basis of its review, the staff concludes that cracking in fiberglass components in sea water is not an aging effect that requires aging management.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explained, in its technical report for open water, that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system. The staff reviewed the technical report, current industry research and operating experience and finds that these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95 °F. On the basis of its review, the staff concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for rubber expansion joints exposed to air.

In the LRA, the applicant has identified no aging effects for rubber expansion joints exposed to sea water. The applicant explained, in its technical report for open water, that change of material properties and cracking due to thermal of rubber components exposed to sea water are aging effects that do not require aging management for the components in this system. The staff reviewed the technical report, current industry research and operating experience and finds that the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95 °F. In addition, the surface temperature of the rubber expansion joints in the open water systems will likely never exceed 95 °F, since the internal water (raw water from the Long Island Sound) is significantly less than 95 °F. On the basis of its review, the staff concludes that it did not identify any concerns with the applicant's conclusions that there are no applicable aging effects for rubber expansion joints exposed to sea water since these components are not exposed to temperatures greater than 95 °F.

3.3B.2.3.2 Service Water - Aging Management Evaluation - Table 3.3.2-2

The staff reviewed LRA Table 3.3.2-2, which summarized the results of AMR evaluations for the service water system component groups.

In LRA Table 3.3.2-2, the applicant proposed to manage build up of deposit of carbon steel pipe component type exposed to sea water using MPS AMP B2.1.21, "Service Water System," which is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System." However, buildup of deposits due to biofouling is not identified in the GALL Report as an aging effect for the pipes and strainers component types. The applicant, in its technical report for open water, stated that the carbon steel and cast iron material lined piping interfaces with sea water and is subject to macro-fouling, silting, and sedimentation. Therefore, buildup of deposits is a potential aging effect for these components that requires aging management.

The applicant, in LRA Appendix C (page C-24), described that buildup of deposits due to biofouling is an aging effect requiring aging management for heat exchanger tubes, tube sheets, and lined components. The applicant stated that lined piping was included because piping can contribute to heat exchanger fouling since small segments of the coating can become detached and foul associated heat exchangers. Buildup of deposits does not directly effect the pressure boundary of the lined piping. However, prolonged operation with deteriorated coatings would lead to loss of material. For this reason, both buildup of deposits and loss of material are managed by the service water system (open-cycle cooling) aging management activity. Specifically, internal visual inspections of the service water piping are periodically performed.

The staff reviewed the service water system program and its evaluation is documented in Section 3.0.3.2.15 of this SER. On the basis of its review of the applicant program and technical report, together with current industry research and operating experience, the staff finds that the service water program is acceptable for managing buildup of deposits for the lined components, since internal visual inspections of the service water components will be periodically performed to detect any sign of deposit build up.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy pipe control building HVAC booster pump, MCC and rod control HVAC booster pump, valves, and tubing types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

The applicant, in the LRA, proposed to manage loss of material of copper alloy pipe and valve external surfaces caused by borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In LRA Table 3.3.2-2, the applicant proposed to manage loss of material for nickel-based alloys expansion joints, flow elements, pipe and restricting orifices exposed to sea water using MPS AMP B2.1.21, “Service Water System (Open-Cycle Cooling),” which is consistent with the GALL XI.M20 program. However, loss of material for nickel-based components types in treated water as a component, material, environment, and aging effect combination is not identified in the GALL Report. The applicant, in its technical report for open water, stated that the nickel-based alloys in sea water are exposed to low flow conditions with an aggressive environment. Therefore, pitting corrosion is a potential aging mechanism. The staff reviewed the service water system program and its evaluation is documented in Section 3.0.3.2.15 of this SER. The staff finds that this program implements the intent of GL 89-13. On the basis of its review of the applicant’s program and technical report, together with current industry research and operating experience, the staff finds that the service water program is acceptable for managing loss of material of nickel-based alloys (due to pitting corrosion) components in a sea water environment for this system.

In LRA Table 3.3.2-2, the applicant proposed to manage loss of material for titanium valves exposed to sea water using MPS AMP B2.1.21, “Service Water System (Open-Cycle Cooling),” which is consistent with the GALL XI.M20 program. However, loss of material for titanium component types in treated water is not identified in the GALL Report. The applicant, in its technical report for open water, stated that loss of material due to erosion of titanium component is possible in a sea water environment. The titanium components in this application have flow rates greater than 50 feet per second (fps) or contain fluids with high particulates. Therefore, erosion is a potential aging mechanism. The staff reviewed the service water system program and its evaluation is documented in Section 3.0.3.2.15 of this SER. The staff finds that this program implements the intent of the NRC Guidelines set forth in GL 89-13. On the basis of its review of the applicant’s program and technical report, together with current industry research and operating experience, the staff finds that the service water program is acceptable for managing loss of material due to erosion/corrosion for titanium valves in a sea water environment.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explained, in its technical report for open water, that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. The applicant explained, in its technical report for open water, that change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air are aging effects that do not require aging management for the components in this system. The staff reviewed the technical report, current industry research and operating experience and finds that these components are not exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95 °F. On the basis of its review, the staff concludes that it did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for rubber expansion joints exposed to air.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to sea water. The applicant stated in its technical report for open water, stated that change of material properties and cracking due to thermal of rubber components in sea water are aging effects that do not require aging management for the components in this system.

The staff reviewed technical report, current industry research and operating experience and finds that the threshold temperature for applying the aging effects of cracking and change of material properties to elastomers is 95 °F. In addition, the surface temperature of the rubber expansion joints in the open water systems will never exceed 95 °F, since the internal water (raw water from the Long Island Sound) is significantly less than 95 °F. On the basis of its review, the staff concludes that it did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects for rubber expansion joints exposed to sea water since these components are not exposed to temperatures greater than 95 °F.

In the LRA, the applicant has identified no aging effects for stainless steel spool piece and titanium valves exposed internally/externally to air. Air is not identified in the GALL Report as an environment for this combination of component and material.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Wrought austenitic stainless steel and titanium are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.3 Sodium Hypochlorite - Aging Management Evaluation - Table 3.3.2-3

The staff reviewed LRA Table 3.3.2-3, which summarized the results of AMR evaluations for the sodium hypochlorite system component groups.

The applicant, in the LRA, proposed to manage loss of material of copper alloy pipes exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA, the applicant identified no aging effects for fiberglass piping component types exposed to air. The applicant, in its technical report for open water, stated that reduced strength due to ozone exposure of non-metallic is possible in an air environment. The applicant explained that the fiberglass components exposed to air in this system are not located near high-voltage electrical equipment. Therefore, ozone exposure is not a potential aging mechanism. In addition, a review of operating experience has identified no concerns related to the occurrence of ozone exposure in the open water systems. The staff reviewed the technical report, current industry research and operating experience. On the basis of its review, the staff concludes that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

Based on the review of the applicant’s open water technical report and on the basis of current industry research and operating experience, the staff finds that reduced strength due to ozone for fiberglass components in air environment is not an aging effect that requires aging management.

The applicant identified no aging effects for fiberglass piping component types exposed to sea water. The applicant stated, in its open water system AMR technical report, that exposure to ultraviolet radiation and ozone can cause damage to the chemical structure of the epoxy matrix of fiberglass. The earliest signs of this effect can be changes in color and surface cracking or crazing. Fiberglass exposed to direct sun or high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect.

On the basis of the open water technical report, current industry research, and operating experience, the fiberglass components in sea water environment are not exposed to high levels of ultraviolet radiation or ozone. Therefore, the staff finds that cracking in fiberglass components in sea water is not an aging effect that requires aging management.

The applicant identified no aging effects for PVC pipe and valve component types exposed to air and sea water. Current industry research and operating experience reviews have identified instances of PVC degradation resulting from exposure to direct sunlight and exposure to ozone from high voltage. The MPS MAER technical report identifies the aging effect of reduced strength due to ozone exposure for PVC components exposed to sea water, and reduced strength due to ozone exposure or ultraviolet exposure for PVC components exposed to air. The AMR evaluated PVC components for the above aging effects and concluded that no aging management was required. This conclusion was based on the fact that the PVC components are not exposed to direct sunlight and are not exposed to high levels of ozone, since they are not in close proximity to high voltage electrical equipment.

On the basis of the open water technical report, current industry research, and operating experience, the staff finds that reduced strength PVC components in air or seawater environment is not an aging effect that requires aging management.

3.3B.2.3.4 Reactor Plant Component Cooling - Aging Management Evaluation - Table 3.3.2-4 and Table 3.3.2-4a

The staff reviewed LRA Table 3.3.2-4 and the applicant's letter, dated January 11, 2005, which summarize the results of AMR evaluations for the reactor plant component cooling (RPCC) system component groups.

In the LRA, the applicant proposed to manage loss of RPCC heat exchanger copper alloy tubes in treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the loss of material. On the basis of its review, the staff concludes that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed external surfaces of heat exchanger tubes to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of external surfaces of the copper alloy RPCC heat exchanger channel and valves exposed to borated water leakage using the MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the use of the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the LRA and supplement dated January 11, 2005, the applicant proposed to manage loss of material of stainless steel and copper alloy RPCC heat exchanger channel, valves, flow elements, hoses, tubing, and radiation detectors component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

3.3B.2.3.5 Turbine Plant Component Cooling Water - Aging Management Evaluation - Table 3.3.2-5

The staff reviewed LRA Table 3.3.2-5, which summarized the results of AMR evaluations for the turbine plant component cooling water system component groups.

In the Unit 2 LRA, the applicant proposed to manage loss of material of stainless steel pipe and valve component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program an its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

3.3B.2.3.6 Chilled Water - Aging Management Evaluation - Table 3.3.2-6

The staff reviewed LRA Table 3.3.2-6, which summarized the results of AMR evaluations for the chilled water system component groups.

In the LRA, the applicant proposed to manage loss of material of external surfaces of the copper alloy tubing and valves exposed to borated water leakage using the MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the use of the general condition monitoring program in lieu of the boric acid corrosion program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the LRA, the applicant also proposed to manage loss of material of stainless steel and copper alloy tubing, valves, flow elements, and hoses component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

3.3B.2.3.7 Charging Pumps Cooling - Aging Management Evaluation - Table 3.3.2-7

The staff reviewed LRA Table 3.3.2-7, which summarized the results of AMR evaluations for the charging pumps cooling system component groups.

In the LRA, the applicant proposed to manage loss of material of external surfaces of the copper alloy valves exposed to borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy charging pump coolers channel and shell, valves, flow elements, pumps, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

3.3B.2.3.8 Safety Injection Pumps Cooling - Aging Management Evaluation - Table 3.3.2-8

The staff reviewed LRA Table 3.3.2-8, which summarized the results of AMR evaluations for the safety injection pumps cooling system component groups.

In the LRA, the applicant proposed to manage loss of material of external surfaces of the copper alloy safety injection pump coolers shell and channel and valves exposed to borated water leakage using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy safety injection pump coolers shell and channel, valves flow elements, pumps, restricting orifices, and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

3.3B.2.3.9 Neutron Shield Tank Cooling - Aging Management Evaluation - Table 3.3.2-9

The staff reviewed LRA Table 3.3.2-9, which summarized the results of AMR evaluations for the neutron shield tank cooling system component groups.

In the LRA, the applicant proposed to manage loss of material of external surfaces of the copper alloy valves exposed to borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program in lieu of boric acid corrosion is acceptable for managing loss of material due to borated acid leakage on external surfaces of copper alloy components in this system.

In the LRA, the applicant proposed to manage loss of material of stainless steel and copper alloy valves and tubing component types exposed to a moisture-laden air and/or intermittently wetted environments using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

3.3B.2.3.10 Containment Atmosphere Monitoring - Aging Management Evaluation - Table 3.3.2-10

The staff reviewed LRA Table 3.3.2-10, which summarized the results of AMR evaluations for the containment atmosphere monitoring system component groups. The staff reviewed the technical report for AMR results for the air and gas systems.

In the LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed internally or externally to air, including bolting, pipe, and valves component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no applicable aging effects for metal in an air environment.

3.3B.2.3.11 Containment Instrument Air - Aging Management Evaluation - Table 3.3.2-11

The staff reviewed LRA Table 3.3.2-11, which summarized the results of AMR evaluations for the containment instrument air system component groups. The staff reviewed the technical report for AMR results for the air and gas systems.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed externally to a borated water leakage environment using the MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, "Boric Acid Corrosion" to manage this aging effect. The applicant stated, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff concludes that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valves component types exposed to a borated water.

In the LRA, the applicant identified no aging effects for stainless steel, low-alloy steel, and copper alloys components exposed internally or externally to air, including bolting, pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.12 Instrument Air - Aging Management Evaluation - Table 3.3.2-12

The staff reviewed LRA Table 3.3.2-12, which summarized the results of AMR evaluations for the instrument air system component groups. The staff reviewed the technical report for AMR results for the air and gas systems.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe and valve component types exposed externally to a borated water leakage environment using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, "Boric Acid Corrosion" to manage this aging effect. The applicant stated, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of copper alloy pipe and valves exposed externally to a borated water leakage environment.

In the LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloys components exposed externally, including air dryers, filters, instrument air aftercooler (shell), instrument air compressor (intercooler shell), instrument air filter silencer, instrument air receiver, pipe, strainers, traps, valves, instrument air compressor, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant also proposed to manage loss of materials of copper alloy instrument air aftercooler (tubing) component type in an environment of treated water (closed cooling water) using MPS AMP B2.1.7, “Closed-Cycle Cooling Water System.” The staff reviewed the closed-cycle cooling water system program and its evaluation is documented in Section 3.0.3.2.4 of this SER. The staff finds that the closed-cycle cooling water system program is consistent with GALL AMP XI.M21, “Closed-Cycle Cooling Water System,” with an acceptable exception. On the basis of its review, the staff finds that the closed-cycle cooling water system program is acceptable for managing loss of material of components in the treated water environment that are serviced by closed-cycle cooling system.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe exposed externally to a damp soil environment using MPS AMP B2.1.4, “Buried Piping Inspection Program.” The staff reviewed the buried piping inspection program and its evaluation is documented in Section 3.0.3.2.1 of this SER. The staff finds that the buried piping inspection program is consistent with GALL AMP XI.M28, “Buried Piping and Tanks Surveillance” and GALL AMP XI.M34, “Buried Piping and Tanks Inspection,” with acceptable exceptions and enhancements. The program includes a baseline inspection of representative samples of piping with different protective measures and also inspections of buried components when piping is excavated during maintenance or for any other reason. On the basis of its review, the staff finds that the program is acceptable for managing loss of material.

In the LRA, the applicant proposed to manage loss of material of copper alloy instrument air compressor (intercooler tubing) component groups exposed externally to moisture-laden air and/or an intermittently wetted environment (but internal to the air compressor) using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components (external surface of intercooler tubing) to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for the cast iron air compressor component type exposed internally to oil. However, the combination of cast iron in oil was not addressed in the applicant’s technical report for AMR results for the air and gas systems, and that no basis was evident for the applicant's conclusion that there was no aging effect for this component type. During the audit and review, the staff requested that the applicant provide a basis for considering no aging effects. In an LRA supplement dated July 7, 2004, the applicant stated that the oil environment was inadvertently listed for the instrument air compressor. On the basis of its review, the staff finds the applicant’s response acceptable.

3.3B.2.3.13 Nitrogen - Aging Management Evaluation - Table 3.3.2-13

The staff reviewed LRA Table 3.3.2-13, which summarized the results of AMR evaluations for the nitrogen system component groups. The staff reviewed the applicant’s technical report, which provides the AMR results for the air and gas systems.

In the LRA, the applicant identified no aging effects for carbon steel components exposed externally to air, including pipe and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed internally to gas for pipe and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (nitrogen, which is an inert gas) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff concludes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

3.3B.2.3.14 Service Air - Aging Management Evaluation - Table 3.3.2-14 and Table 3.3.2-14a

The staff reviewed Table 3.3.2-14 of the LRA and Table 3.3.2-14a in the applicant's letter dated January 11, 2005, which summarizes the results of AMR evaluations for the service air system component groups. The staff reviewed the applicant's technical report, which provides the AMR results for the air and gas systems.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff notes that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA and the applicant's supplement dated January 11, 2005, the applicant proposed to manage loss of material of stainless steel pipe, valves, and flow transmitters component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In LRA and the applicant's letter dated January 11, 2005, the applicant identified no aging effects for carbon steel and stainless steel components exposed externally to air, including pipe, valves and flow transmitters component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.15 Chemical and Volume Control - Aging Management Evaluation - Table 3.3.2-15 and Table 3.3.2-15a

The staff reviewed Table 3.3.2-15 of the LRA and the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the CVCS component groups.

In the LRA and the applicant's supplement dated January 11, 2005, the applicant identified no aging effects for carbon steel, low-alloy steel, and stainless steel components exposed to air, including bolting, charging pump lube oil coolers (shell), chiller surge tank, letdown chiller heat exchanger (shell), level indicators, lube oil reservoirs, pipe, pumps, thermal regeneration chiller compressor oil cooler (channel head), thermal regeneration chiller compressor oil cooler (shell), thermal regeneration chiller condenser (channel head) thermal regeneration chiller condenser (shell), thermal regeneration chiller evaporator (shell), valves, boric acid blender and tanks, chemical mixing tank, demineralizer, excess letdown heat exchanger (channel head), filter/strainer, flexible hoses, flow element, letdown chiller heat exchanger (channel head), letdown heat exchanger (channel head), letdown reheat heat exchanger (channel head and shell), moderating heat exchanger (channel head and shell), moderating heat exchanger (shell), RCP seal standpipes, regenerative heat exchanger (channel head), regenerative heat exchanger (shell), restricting orifices, seal water heat exchanger (channel head), tubing, volume control tank, and boric acid batching tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of carbon steel, and copper alloy charging pump lube oil coolers (tubes), charging pump lube oil coolers (tubesheet), charging pump lube oil coolers (shell), CS manifolds (charging pump LO), flexible hoses, level indicators, lube oil reservoirs, pipe, pumps, thermal regeneration chiller compressor oil cooler (channel head), thermal regeneration chiller compressor oil cooler (tube sheet), thermal regeneration chiller compressor oil cooler (tubes), tubing, and valve component types exposed internally or externally to oil using MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material. The staff's evaluation of the work control process program is documented in Section 3.0.3.3.4 of this SER.

In the LRA, the applicant identified no aging effects for stainless steel components exposed internally to gas or air for pipe, valves, and volume control tank component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) or air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas or air environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed internally to air for thermal regeneration chiller condenser (shell), thermal regeneration chiller evaporator (shell), and valve component types. Air is not identified in the GALL Report as an environment for these components and materials. However, the applicant identifies Note 5 for these components (page 3-273 and page 3-276). Specifically, Note 5 addresses external environment of air and not internal environment. During the audit and review, the applicant was requested to clarify this issue. In an LRA supplement dated July 7, 2004, the applicant stated that the Note 5 should be replaced with Note 6 in LRA Table 3.3.2-15 (page 3-273) for CVCS component groups "Thermal Regeneration Chiller Condenser (shell)" and "Thermal Regeneration Chiller Evaporator (shell)" for an internal environment of air. On the basis of its review, the staff finds the applicant's response acceptable.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of copper alloy charging pump lube oil coolers (tubes), and charging pump lube oil coolers (tube sheet) component types exposed internally to treated water using MPS AMP B2.1.7, "Closed-Cycle Cooling Water System." The staff reviewed the closed-cycle cooling water system program and its evaluation is documented in Section 3.0.3.2.4 of this SER. The staff finds that the closed-cycle cooling water system program is consistent with GALL AMP XI.M.21, "Closed-Cycle Cooling Water System" with an acceptable exception. The exception is performance testing of the closed-cycle cooling water side of heat exchangers. On the basis of its review, the staff finds the closed-cycle cooling water program acceptable for managing the aging effect of loss of material for these component groups.

3.3B.2.3.16 Reactor Plant Sampling - Aging Management Evaluation - Table 3.3.2-16 and Table 3.3.2-16a

The staff reviewed Table 3.3.2-16 of the LRA and Table 3.3.2-16a in the applicant's letter, dated January 11, 2005, which summarizes the results of AMR evaluations for the reactor plant sampling system component groups.

In the LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, flexible hoses, piping, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.17 Primary Grade Water - Aging Management Evaluation - Table 3.3.2-17

The staff reviewed LRA Table 3.3.2-17, which summarized the results of AMR evaluations for the primary grade water system component groups.

In the LRA, the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including bolting, piping, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.18 Auxiliary Building Ventilation - Aging Management Evaluation - Table 3.3.2-18

The staff reviewed LRA Table 3.3.2-18, which summarized the results of AMR evaluations for the auxiliary building ventilation system component groups.

In the LRA, the applicant proposed to manage loss of material of stainless steel flow elements, pipe, and tubing component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff finds the general condition monitoring acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA, the applicant identified no aging effects for carbon and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including auxiliary building filter bank housings, damper housings, ductwork, filter bank housing, MCC rod control and cable vault air conditioning air supply unit, pipe, silencers, valves, flow elements, and tubing component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including auxiliary building heating and ventilation air supply heating coils component types.

The applicant stated in the LRA that surfaces of copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.19 Circulating and Service Water Pumphouse Ventilation - Aging Management Evaluation - Table 3.3.2-19

The staff reviewed LRA Table 3.3.2-19, which summarized the results of AMR evaluations for the circulating and service water pumphouse ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, fan/blower housing, and silencer component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.20 Containment Air Recirculation - Aging Management Evaluation - Table 3.3.2-20

The staff reviewed LRA Table 3.3.2-20 which summarized the results of AMR evaluations for the containment air recirculation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including containment air recirculation cooling unit housings, damper housings, ductwork, fan/blower housing, and tubing component types.

The applicant stated in the LRA that surfaces of carbon steel and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the

basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.21 Containment Purge Air - Aging Management Evaluation - Table 3.3.2-21

The staff reviewed LRA Table 3.3.2-21, which summarized the results of AMR evaluations for the containment purge air system component groups.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including damper housing, ductwork, pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed internally to air, including damper housing, ductwork, pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Therefore, the staff did not identify any concerns with the applicant’s conclusions that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for copper alloy components exposed to air, including containment purge heating and ventilation air supply heating coils component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Without the presence of the aggressive environment, copper alloy components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.22 Containment Leakage Monitoring - Aging Management Evaluation - Table 3.3.2-22

The staff reviewed LRA Table 3.3.2-22, which summarized the results of AMR evaluations for the containment leakage monitoring system component groups. In the LRA, the applicant identified no aging effects for carbon and stainless steel components exposed to air, including pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon and stainless steel components exposed internally to air, including pipe, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is dry air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.23 Containment Vacuum - Aging Management Evaluation - Table 3.3.2-23 and Table 3.3.2-23a

The staff reviewed Table 3.3.2-23 of the LRA and Table 3.3.2-23a in the applicant's supplement dated January 11, 2005, which summarized the results of AMR evaluations for the containment vacuum system component groups.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including bolting component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended

operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA and the applicant's supplement dated January 11, 2005, the applicant identified no aging effects for stainless steel components exposed to an indoors air environment and are not intermittently wetted, including pipe, valves, pumps, and vacuum ejector component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.24 Control Building Ventilation - Aging Management Evaluation - Table 3.3.2-24

The staff reviewed LRA Table 3.3.2-24, which summarized the results of AMR evaluations for the control building ventilation system component groups.

In the LRA, the applicant proposed to manage loss of material of stainless steel and carbon steel chiller reservoirs, filter/strainer housing, pipe, valves, pumps (control building HVAC chiller oil pump), chiller oil coolers (shell), chiller oil coolers (tubes),and chiller oil coolers (tubesheet) component types exposed internally or externally to oil using MPS AMP B2.1.25, "Work Control Process." The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified.

The staff finds the work control process program acceptable for managing the aging effect of loss of material. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER.

In the LRA, the applicant proposed to manage loss of material of stainless steel expansion joints, flow elements, moisture indicators, tubing, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including air storage tanks, control building air handling units (housing), control room emergency ventilation filter bank housings, damper housings, duct flow restrictors, ductwork, fan blower housing, filter/strainer housing, heater housing, humidifiers, pipe, tubing, and valves component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed "warm, moist air" to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, "moist air" alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for cast iron and copper alloy components exposed internally or externally to gas for economizers, evaporator (shell), evaporator (tubesheet), evaporator (tubes), and compressor component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

3.3B.2.3.25 CRDM Ventilation and Cooling - Aging Management Evaluation - Table 3.3.2-25

The staff reviewed LRA Table 3.3.2-25, which summarized the results of AMR evaluations for the CRDM ventilation and cooling system component groups.

All line items in this system are consistent with the GALL Report.

3.3B.2.3.26 Emergency Generator Enclosure Ventilation - Aging Management Evaluation - Table 3.3.2-26

The staff reviewed LRA Table 3.3.2-26, which summarized the results of AMR evaluations for the emergency generator enclosure ventilation system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, ductwork, and fan blower housing component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.27 ESF Building Ventilation - Aging Management Evaluation - Table 3.3.2-27

The staff reviewed LRA Table 3.3.2-27, which summarized the results of AMR evaluations for the ESF building ventilation system component groups.

In the LRA Table 3.3.2-27 the applicant credits MPS AMP B.2.1.25, “Work Control Process,” to manage loss of material of carbon steel condensers (shell) and copper alloy condenser (tubes) exposed internally and externally to gas, respectively (Note G). However, also in LRA Table 3.3.2-27, the staff identified several other carbon steel and copper alloy component types that have no aging effect in the same environment (Note G). During the audit and review, the staff asked the applicant to justify the difference in aging effects and AMPs between the two material, environment, aging effect, and AMP combinations.

In the applicant’s response, dated January 11, 2005, the applicant stated that it was conservatively assumed that a small amount of moisture may be present in the refrigerant gas environment. This moisture could condense in the condenser shell-side due to exposure to cooling water (cold seawater) on the tube-side of the condenser. Therefore, the loss of material aging effect was applied to the condenser shell and tubes exposed to a gas environment. Other carbon steel and copper alloy components are not exposed to potential condensation and, therefore, would not experience the same aging effect.

In LRA Table 3.3.2-27, the applicant credits MPS AMP B.2.1.25, “Work Control Process,” to manage loss of material of copper alloy condensers (tubes) exposed externally to gas (Note A). This AMR line item references the GALL Report Item VII.F.2.2-a, which is an environment of warm, moist air. The staff asked the applicant to clarify the environment, aging effect, and aging management program combination.

In its response, dated January 11, 2005, the applicant stated that the potential for moisture in the refrigerant gas was incorrectly compared to the warm, moist air environment described in GALL Report Item VII.F2.2-a. No matching item from the GALL Report should have been listed in LRA Table 3.3.2-27 for this item and Note G should have been listed instead of Note A. On the basis of its review, the staff finds the applicant’s response acceptable.

3.3B.2.3.28 Fuel Building Ventilation - Aging Management Evaluation - Table 3.3.2-28

The staff reviewed LRA Table 3.3.2-28, which summarized the results of AMR evaluations for the fuel building ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel, copper alloys and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, fan blower housing, fuel building filter bank housing, heating coils (fuel building), pipe, silencers, tubing, and valve component types.

The applicant stated in the LRA that surfaces of carbon steel, copper alloys and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment

3.3B.2.3.29 Hydrogen Recombiner and Hydrogen Recombiner Building HVAC - Aging Management Evaluation - Table 3.3.2-29

The staff reviewed LRA Table 3.3.2-29, which summarized the results of AMR evaluations for the hydrogen recombiner and hydrogen recombiner building HVAC system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel HVAC components exposed internally or externally to air that is not intermittently wetted, including airblast heat exchangers, damper housing, ductwork, fan/blower housing, pipe, flow elements, radiant heaters, reaction chamber, tubing, and valve component types.

The applicant stated in the LRA that surfaces of carbon and stainless steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.30 Main Steam Valve Building Ventilation - Aging Management Evaluation - Table 3.3.2-30

The staff reviewed LRA Table 3.3.2-30, which summarized the results of AMR evaluations for the main steam valve building ventilation system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and copper alloy HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, ductwork, fan/blower housing, and heating coils (main steam valve building) component types.

The applicant stated in the LRA that surfaces of carbon steel and copper alloy components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.31 Service Building Ventilation and Air-Conditioning - Aging Management Evaluation - Table 3.3.2-31

The staff reviewed LRA Table 3.3.2-31, which summarized the results of AMR evaluations for the service building ventilation and air-conditioning system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including damper housing, and ductwork component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.32 SBO Diesel Generator Building Ventilation - Aging Management Evaluation - Table 3.3.2-32

The staff reviewed LRA Table 3.3.2-32, which summarized the results of AMR evaluations for the SBO diesel generator building ventilation system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally or externally to air that is not intermittently wetted, including air conditioning units; self contained housing component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.33 Supplementary Leak Collection and Release - Aging Management Evaluation - Table 3.3.2-33

The staff reviewed LRA Table 3.3.2-33, which summarized the results of AMR evaluations for the supplementary leak collection-and-release system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel components exposed to air, including damper housings, ductwork, fan/blower housings, flow elements, pipe, pipe (stack), filter bank housings, tubing, valves, valves (stack) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended

operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon and stainless steel components exposed internally to air, including damper housings, ductwork, fan/blower housings, flow elements, pipe, pipe (stack), filter bank housings, tubing, valves, valves (stack) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is dry air. Significant amounts of corrosion of carbon steel require an electrolytic environment, and a simultaneous presence of oxygen and moisture. Significant corrosion of carbon steel in air environment also requires the components to be subject to condensation. Without the presence of the aggressive environment, therefore, carbon steel components will experience insignificant amounts of corrosion, and no aging effects would be applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.34 Turbine Building Area Ventilation - Aging Management Evaluation - Table 3.3.2-34

The staff reviewed LRA Table 3.3.2-34, which summarized the results of AMR evaluations for the turbine building area ventilation system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the

basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.35 Waste Disposal Building Ventilation - Aging Management Evaluation - Table 3.3.2-35

The staff reviewed LRA Table 3.3.2-35, which summarized the results of AMR evaluations for the waste disposal building ventilation system component groups. In the LRA, the applicant identified no aging effects for carbon steel HVAC components exposed internally and externally to air that is not intermittently wetted, including damper housings, and ductwork component types.

The applicant stated in the LRA that surfaces of carbon steel components located within structures have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting conditions, such as condensation. The applicant interprets the GALL Report environment termed “warm, moist air” to be air with an undefined relative humidity level, and not a wetted environment. Since the AMR approach considers loss of material only in a moisture-laden air and/or intermittently wetted environment, the GALL Report items were determined to be not applicable.

The staff reviewed the Unit 3 operating experience as a confirmation of the validity of the AMR approach for corrosion in an air environment. The operating experience reviews did not find significant corrosion of ventilation system components (other than cooling coils and associated components) due to the air environment. The staff finds that, based on the absence of significant corrosion, “moist air” alone does not result in corrosion for these components. On the basis of its review, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.36 Unit 2 Fire Protection - Aging Management Evaluation - Table 3.3.2-36

The staff reviewed LRA Table 3.3.2-36, which summarized the results of AMR evaluations for the Unit 2 fire protection system component groups.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including flame arrestors, flex connections, flow indicators, flow orifices, nozzles, pipe, pumps, retard chambers, sprinkler heads, strainers, tubing, valves, and water motor gongs component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel drip pans and tubing component types exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.13, “General Condition Monitoring Program,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion,” to manage this aging effect. The applicant stated in Note 1 that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components.

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, visual inspection of external surfaces is performed during various walkdowns by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of copper alloy pipe, tubing, and valve component types exposed to a borated water leakage external environment.

In the LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, and copper alloy components exposed internally to an environment of air or gas, including flex connections, flow orifices, nozzles, pipe, sprinkler heads, tubing, valves, and water motor gongs component types. Gas is not identified in the GALL Report as an environment for these components and materials. However, the staff identified a discrepancy between Unit 2 fire protection system sprinkler heads and Unit 3 fire protection sprinkler heads in that the sprinkler heads in Unit 3 were in a moist air environment and had an aging effect of loss of materials. In its LRA supplement dated July 7, 2004, the applicant stated that the Unit 2 fire protection system, as presented in LRA Table 3.3.2-36, Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy “sprinkler head” component group exposed internally to an air environment for the Unit 2 fire protection system. The aging effect of “loss of material” should be added to this component group. The fire protection program will manage these aging effects. Based on the addition of this aging effect, the staff finds the applicant’s response to be acceptable.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal components in a gas environment.

The applicant, in the LRA, proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.10, "Fire Protection Program," which is consistent with GALL AMP XI.M26, "Fire Protection," and GALL AMP XI.M27, "Fire Water System." The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. On the basis of its review, the staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the LRA, the applicant proposed to manage loss of material of stainless steel flex connections component type exposed internally to an environment of oil using AMP B2.1.25, "Work Control Process." The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

3.3B.2.3.37 Unit 3 Fire Protection - Aging Management Evaluation - Table 3.3.2-37

The staff reviewed LRA Table 3.3.2-37, which summarized the results of AMR evaluations for the Unit 3 fire protection system component groups.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy, and PVC components exposed to air, including carbon dioxide (CO_2) tank cooling coils, coolant heat exchangers, flex hoses, flex connections, flow switches, instrument snubbers, nozzles, restricting orifices, sprinkler heads, tubing, valves, flow indicators, housing, diesel fuel storage tank, ductwork, exhaust silencer, expansion tank overflow container, reactor coolant pump oil collection tanks, flame arrestors, heater unit, hydropneumatic tank, lube oil cooler, odorizer, oil mist recovery unit, oil reservoir, pipe, pumps, vacuum limiter, and water manifold component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel and copper alloy are not susceptible to significant general corrosion that would affect the intended function of components. PVC is impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

However, LRA Table 3.3.2-37, Auxiliary Systems - Unit 3 Fire Protection, for external surfaces of copper alloy valves in an environment of air, did not include the aging effect of loss of material as in Unit 2 Table 3.3.2-36, Auxiliary Systems - Unit 2 Fire Protection. In LRA supplement dated

July 7, 2004, the applicant stated that for the Unit 3 fire protection system, as presented in Unit 2 Table 3.3.2-36, Note 2 (subject to moisture-laden air and/or intermittently wetted environment), should be included with the copper alloy “valves” component group exposed internally to an air environment for Unit 2 LRA, Table 3.3.2-36, Auxiliary Systems - Unit 3 Fire Protection. The aging effect of “loss of material” will be added to this component group. The applicant stated that fire protection program will manage this aging effect. Based on the addition of this aging effect, the staff finds the applicant’s response to be acceptable.

In the LRA, the applicant proposed to manage loss of material of copper alloy filter/strainer component type exposed externally to a moisture-laden air and/or intermittently wetted environment using AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, and copper alloy components exposed internally to an environment of air or gas for CO_2 storage tank, CO_2 tank cooling coils, damper housing, fan/blower housing, ductwork flex hoses and connections, nozzles, odorizers, restricting orifices, tubing, and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in a gas environment.

In the LRA, the applicant proposed to manage loss of material of copper alloy sprinkler heads exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.10, “Fire Protection Program,” which is consistent with GALL AMP XI.M26, “Fire Protection,” and GALL AMP XI.M27, “Fire Water System.” The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff finds that the fire protection program is acceptable for managing loss of material since visual inspections will be performed on internal surfaces to detect any sign of aging degradation during maintenance activities.

In the LRA, the applicant proposed to manage loss of material of stainless steel tubing component type exposed internally to an environment of oil using AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants that are an indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of copper alloy and stainless steel tubing and restricting orifices component types exposed internally to oil (fuel oil) using AMP

B2.1.12, “Fuel Oil Chemistry.” The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program is consistent with GALL AMP XI.M30, “Fuel Oil Chemistry,” with acceptable exceptions. On the basis of its review, the staff finds the program acceptable for managing the aging effects of loss of material. The effectiveness of the fuel oil chemistry program is verified by MPS AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

During the audit and review, the staff questioned why various portions of the fire protection system were not included within the scope of license renewal and subject to an AMR. In its LRA supplement dated July 7, 2004, the applicant added several components to the fire protection system that are subject to an AMR. The addition of these components did not result in the addition of material/environment combinations or AMPs for the fire protection system AMR. The staff finds this material/environment/aging effect/AMP combination to be acceptable. The staff's evaluation of the scope of the fire protection system is documented in Section 2.3B.3.39 of this SER.

3.3B.2.3.38 Domestic Water - Aging Management Evaluation - Table 3.3.2-38

The staff reviewed LRA Table 3.3.2-38, which summarized the results of AMR evaluations for the domestic water system component groups.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, shock absorbers, strainers, and valve component types exposed externally to a moisture-laden air and/or intermittently wetted environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon steel heater component type exposed to air. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe and valves exposed externally to an environment of borated water leakage using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. However, the GALL Report specifies GALL AMP XI.M10, “Boric Acid Corrosion” to manage this aging effect. The applicant stated, in Note 1, that the boric acid corrosion program includes specific inspections of reactor coolant pressure boundary and supporting systems components. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the boric acid corrosion program. Also, a visual inspection of external surfaces is performed during various walkdowns performed by plant personnel to look for boron buildup and/or boric acid leaks. On the basis of its review, the staff finds that this program is acceptable for managing loss of material of copper alloy pipe and valves exposed to externally to an environment of borated water.

3.3B.2.3.39 Emergency Diesel Generators - Aging Management Evaluation - Table 3.3.2-39

The staff reviewed LRA Table 3.3.2-39, which summarized the results of AMR evaluations for the emergency diesel generators system component groups. The staff reviewed the technical report for the AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of stainless steel, carbon steel, cast iron, and copper alloy engine sumps, filter/strainers, governor lube oil coolers (shell), jacket water heaters, lube oil heat exchangers (shell), oil reservoirs, oil separators, pipe, pre-lube oil heaters, pumps, valves, turbochargers, governor lube oil coolers (tubes), lube oil heat exchangers (tubes), lube oil heat exchangers (tubesheet), and tubing component types exposed internally or externally to oil using MPS AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material due to selective leaching of copper alloy diesel engine jacket water cooler heat exchangers (tubes), and engine air cooler water heat exchangers (tubes) component types exposed to treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material due to selective leaching since other mechanical means will be used in addition to visual inspection to detect selective leaching.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe component types exposed externally to an atmosphere/weather environment using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its review is documented in Section 3.0.3.3.2 of this SER. The staff finds that visual inspections will be performed on external surfaces to detect any sign of aging degradation. The staff finds the general condition monitoring program acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy and aluminum components exposed internally and externally to air, including air distributors, air receiver tanks, air tanks, crankcase vacuum manometers, diesel engine jacket water cooler heat exchangers (shell), engine air cooler water heat exchangers (shell), engine sumps, filter/strainers, fresh water expansion tanks, governor lube oil coolers (shell), jacket water heaters, lube oil heat exchangers (channel), lube oil heat exchangers (shell), oil reservoirs, oil separators, pipe, pre-lube oil heaters, pumps, servo fuel rack shutdown and starting boosters, silencers, valves, turbochargers, level indicators, tubing, diesel engine jacket water cooler heat exchangers (channel), and engine air cooler water heat exchangers (channel, expansion joints, and restricting orifices component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.40 Emergency Diesel Generator Fuel Oil - Aging Management Evaluation - Table 3.3.2-40

The staff reviewed LRA Table 3.3.2-40, which summarized the results of AMR evaluations for the emergency diesel generator fuel oil system component groups. The staff reviewed the technical report for the AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of copper alloy, and stainless steel pumps, tubing, valves, flow elements, restricting orifices, and filter/strainers component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated in LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program.

The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment in license renewal scope. On the basis of its review, the staff finds the fuel oil chemistry program acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, copper alloy and aluminum components exposed internally and externally to air, including flame arrestors, flow elements, accumulator tanks, fuel oil day tanks, fuel oil storage tank, injectors, pipe, pumps, valves, restricting orifices, filter/strainers, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, copper alloy, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.41 Station Blackout Diesel Generator - Aging Management Evaluation - Table 3.3.2-41

The staff reviewed LRA Table 3.3.2-41, which summarized the results of AMR evaluations for the SBO diesel generator system component groups. The staff reviewed the technical report for the AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage cracking of stainless steel expansion tanks, pipe, tubing, and valve component groups exposed internally to treated water using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program is its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of cracking.

In the LRA, the applicant proposed to manage loss of material of stainless steel, carbon steel, and cast iron flow indicators, lube oil coolers (channel), oil sumps, pipe, silencers, pumps, turbo chargers, lube oil coolers (tubes), lube oil coolers (tubesheet), lubricators, restricting orifices, tubing, and valve component types exposed internally or externally to oil using MPS AMP

B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of stainless steel fuel heaters, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated, in LRA Section 3.3.2.2.7, that MPS AMP B2.1.25, “Work Control Process” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2) establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. On the basis of its review, the staff finds the fuel oil chemistry program acceptable for managing this aging effect.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant proposed to manage loss of material of stainless steel expansion tanks, and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, “General Condition Monitoring,” which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspections will be performed on external surfaces to detect any sign of aging degradation.

In the LRA, the applicant proposed to manage loss of material of stainless steel valve component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to pitting and crevice corrosion since visual inspection will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for carbon steel, stainless steel, cast iron, and aluminum components exposed internally and externally to air, including filter/strainers, radiators, aftercoolers, aspirators, flow Indicators, fuel heaters, fuel oil day tanks, immersion heaters, injectors, lube oil coolers (channel), lube oil coolers (shell), oil sumps, pipe, silencers, pump, turbochargers, air receivers, expansion joints, lubricators, pulsation dampeners, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel, and aluminum are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff concurs that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for rubber expansion joints exposed to air. Based on industry research and operating experience, change of material properties due to thermal exposure and irradiation and cracking due to irradiation of rubber components in air is contingent on radiation levels, ambient temperatures, and exposure to ultraviolet radiation and ozone.

On the basis of its review, the staff concurs with the applicant’s finding that no aging effect for rubber expansion joints in air to be acceptable, since these components are not expected to be exposed to high levels of ultraviolet radiation, ozone, or temperatures greater than 95 °F.

In the LRA, the applicant identified no aging effect for aluminum filter/strainers component group exposed internally to lubricating oil. The technical report for AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum exposed internally to oil. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated that the MAER was used as the basis. The staff reviewed the applicant’s MAER and finds that additional information regarding the basis was necessary. The applicant revised its MAER and the technical report to include the basis. The staff reviewed the basis and finds it acceptable. In addition, the applicant stated that, in a lubricating oil environment, significant corrosion is only expected where the water can settle or pool. Due to the differential densities of lubricating oil and water, water will tend to separate and settle in low flow or stagnant areas where the flow velocity is insufficient to flush the water through the system. Lube oil systems are assumed to be free of water contamination as their initial condition. Lube oil systems are typically closed systems that have little potential for ingress of contaminants unless a component failure occurs. License renewal does not assume component failures as a means to establish the conditions necessary for aging to occur. For example, tube failures in lube oil coolers are not assumed. Therefore, water contamination of lube oil is event driven, and would be addressed by corrective maintenance. For license renewal purposes, lube oil is therefore assumed to be free of water contamination. On the basis of its review, the staff concurs that there are no applicable aging effects requiring management for aluminum in a fuel oil environment.

In the LRA, the applicant identified no aging effects for aluminum radiators component group in an external environment of atmosphere/weather. The technical report for AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum in an external environment of atmosphere/weather. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. During the audit, the applicant stated that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to Aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred.

The staff reviewed the revised technical report and operating experience. On the basis of its review, the staff finds that there are no applicable aging effects requiring management for aluminum in an atmosphere/weather environment.

3.3B.2.3.42 Security - Aging Management Evaluation - Table 3.3.2-42

The staff reviewed LRA Table 3.3.2-42, which summarized the results of AMR evaluations for the security system component groups. The staff reviewed the technical report for AMR results for the diesel generator and support systems.

In the LRA, the applicant proposed to manage loss of material of carbon steel, cast iron, and copper alloy coolers (shell), fan/blower housings, heaters, oil pans, pipe, pump, valves, filter\strainers, coolers (tubes), and coolers (tubesheet) component types exposed internally or externally to lubricating oil using MPS AMP B2.1.25, “Work Control Process.” The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of loss of material.

In the LRA, the applicant proposed to manage loss of material of copper alloy pipe, tubing, and valve component types exposed internally to fuel oil using MPS AMP B2.1.12, “Fuel Oil Chemistry.” The applicant stated in LRA Section 3.3.2.2.7 that MPS AMP B2.1.25, “Work Control Process,” will be used to provide confirmation of the effectiveness of the fuel oil chemistry program. The staff reviewed the fuel oil chemistry program and its evaluation is documented in Section 3.0.3.2.9 of this SER. The fuel oil chemistry program (1) monitors and controls fuel oil quality to ensure that it is compatible with the materials of construction and to manage the conditions that cause general corrosion, pitting, and MIC of fuel tank internal surfaces; (2)

establishes fuel oil quality limits; and (3) samples and tests fuel oil used for equipment within the scope of license renewal. The staff finds the fuel oil chemistry program acceptable.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds the work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. It also provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff concludes that the work control process program is acceptable for confirming the effectiveness of the fuel oil chemistry program.

In the LRA, the applicant identified no aging effects for carbon steel, cast iron, and copper alloy components exposed internally and externally to air, including coolers (channel head), coolers (shell), diesel fuel oil storage tank, fan/blower housings, filter/strainers, heaters, oil pans, pipe, pumps, valves, filter/strainers, tubing, and radiators component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and cast iron requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel and cast iron components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Copper alloys are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for aluminum radiators component type in an external environment of air. The technical report for AMR results for the diesel generator and support systems did not specifically evaluate aging effects for aluminum in an external environment of air. During the audit and review, the staff requested that the applicant provide a basis for its conclusion that there are no aging effects requiring management for this combination of component, material, and environment. The applicant stated to the staff that the technical report was revised to add the following statement:

> Industry experience identified a potential conflict with the MAER with regard to Aluminum in an air environment. St. Lucie identified corrosion problems with the aluminum and copper components associated with the cooling fins of a radiator in a cooling water system. The St. Lucie evaluation identified that it was an unusual occurrence since aluminum elsewhere in the plant did not demonstrate similar problems. Accordingly, and in conjunction with the MAER basis, operating experience was used to validate that no problems of this type had occurred.

The staff reviewed the revised technical report and operating experience. On the basis of its review, the staff finds that there are no applicable aging effects requiring management for aluminum in an air environment.

3.3B.2.3.43 Boron Recovery - Aging Management Evaluation - Table 3.3.2-43 and Table 3.3.2-43a

The staff reviewed Table 3.3.2-43 of the LRA and Table 3.3.2-43a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the boron recovery system component groups.

In the LRA and the applicant's letter, dated January 11, 2005, the applicant identified no aging effects for low-alloy steel and stainless steel components exposed to air, including boron recovery tanks, cesium removal ion exchangers, filters/strainers, pipe, tubing, valves, boron distillate cooler (shell), boron distillate tank, boron evaporator, boron evaporator bottoms coolant preheater, boron evaporator bottons cooler (shell), boron evaporator condenser (channel head), boron evaporator condenser (shell), boron evaporator reboiler (channel head), boron evaporator reboiler (shell), boron evaporator sample cooler (shell), density element, flow indicating switch, flow indicating transmitter, flow transmitters, pumps and traps component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In LRA Table 3.4.2-43, the applicant proposed to manage loss of material for the stainless steel boron recovery tanks exposed internally to air environment using MPS AMP B2.1.24, "Tank Inspection Program." The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds management of loss of material for this component using the tank inspection program to be adequate.

In the applicant's letter, dated January 11, 2005, the applicant proposed to manage loss of material for the boron distillate cooler (shell) and the boron evaporator exposed externally to air environment using MPS AMP B2.1.5, "Chemistry Control for Primary Systems Program." The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

In the applicant's letter dated January 11, 2005, the applicant proposed to manage cracking of carbon steel for density element, flow transmitters, pumps and restricting orifices component types exposed externally to treated water environment using MPS AMP B2.1.25, "Work Control

Process." The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program provides the opportunity for personnel to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. Oil samples are analyzed periodically for contaminants for indication of degradation. The work control process program provides input to the corrective action program if aging effects are identified. The staff finds the work control process program acceptable for managing the aging effect of cracking.

3.3B.2.3.44 Radioactive Liquid Waste Processing - Aging Management Evaluation - Table 3.3.2-44 and Table 3.3.2-44a

The staff reviewed Table 3.3.2-44 of the LRA and Table 3.3.2-44a in the applicant's letter, dated January 11, 2005, which summarized the results of AMR evaluations for the radioactive liquid waste processing system component groups.

In the LRA and applicant's supplement dated January 11, 2005, the applicant identified no aging effects for low-alloy and stainless steel components exposed to air, including flow elements, piping, valves, pumps, radiation detectors, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.3B.2.3.45 Radioactive Gaseous Waste - Aging Management Evaluation - Table 3.3.2-45 and Table 3.3.2-45a

The staff reviewed Table 3.3.2-45 of the LRA and Table 3.3.2-45a in the applicant's supplement, dated January 11, 2005, which summarized the results of AMR evaluations for the radioactive gaseous waste system component groups.

In the LRA, the applicant identified no aging effects for carbon steel and stainless steel components exposed to air, including damper housings, ductwork, pipe, process vent cooler, valves, degasifier condenser (shell), degasifers feed preheater (shell), degasifers, and tubing component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture.

Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of carbon steel and stainless steel pipe and valve component groups exposed internally to moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion.

In the applicant’s letter dated January 11, 2005, the applicant proposed to manage loss of material of stainless steel for the degasifers and tubing exposed internally to treated water and steam environment using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The chemistry control for primary systems program is consistent with the GALL Report, with an acceptable exception. The exception relates to use of a later, non-NRC-approved revision of the EPRI guidelines. On the basis of its review, the staff finds the chemistry control for primary systems program to be acceptable for managing this aging effect.

3.3B.2.3.46 Post-Accident Sampling - Aging Management Evaluation - Table 3.3.2-46

The staff reviewed LRA Table 3.3.2-46, which summarized the results of AMR evaluations for the post-accident sampling system component groups.

In the LRA, the applicant identified no aging effects for stainless steel components exposed internally and/or externally to gas or air for accumulators, de-ionized water flush tank, drain tanks, filter/strainers, flow elements, hoses, hydrogen sensors, pipe, pumps, sample coolers shell, sample cylinders/chambers tubing and valve component types. Gas is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concludes that there are no applicable aging effects requiring management for metal in a gas environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel de-ionized water flush tank, drain tanks, hydrogen sensors, pipe, vacuum pump, sample cylinders/chambers, tubing, and valve component groups exposed internally to a moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, “Work Control Process,” which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. The staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

During the audit and review, the staff determined that additional components/structures were added to the scope of license renewal and subject to an AMR. By letter dated July 7, 2004, the applicant submitted additional information, entitled, “Millstone Power Station Units 2 and 3 Additional Information in Support of Application for renewed Operation Licenses.” The applicant added, in Attachment 1 to its letter, the component type “hydrogen tanks” and “restricting orifices” to the LRA post-accident sampling system screening results and AMR, LRA Table 2.3.3.46 and Table 3.3.2-46, respectively. The applicant stated that the addition of these components did not result in the addition of material/environment/aging effect/program combinations for the LRA post-accident sampling system. The staff reviewed the applicant’s response. On the basis of its review, the staff finds the additional AMR results in LRA Table 3.3.2-46 for the hydrogen tanks and restricting orifices component types acceptable.

3.3B.2.3.47 Radioactive Solid Waste - Aging Management Evaluation - Table 3.3.2-47

The staff reviewed LRA Table 3.3.2-47, which summarized the results of AMR evaluations for the radioactive solid waste system component groups. In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including pipe, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

3.3B.2.3.48 Reactor Plant Aerated Drains - Aging Management Evaluation - Table 3.3.2-48 and Table 3.3.2-48a

The staff reviewed Table 3.3.2-48 of the LRA and Table 3.3.2-48a in the applicant’s letter dated January 11, 2005, which summarized the results of AMR evaluations for the reactor plant aerated drains system component groups.

In the LRA, the applicant identified no aging effects for carbon and stainless steel, PVC, fiberglass, copper alloys, and ethylene propylene diene monomer components exposed to air, including expansion joints, filters/strainers, flow elements, flow indicators, groundwater sumps, pipe, pumps, restricting orifices, tubing, and valve component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The internal environment is air without the presence of moisture. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of carbon steel and copper alloys requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel copper alloy components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. PVC, fiberglass and EPDM are impervious to an air environment. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage loss of material of stainless steel pipe and valve component types exposed to atmosphere/weather using MPS AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. Visual inspections will be performed on external surfaces to detect any sign of aging degradation. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing loss of material due to pitting and crevice corrosion.

In the LRA, the applicant proposed to manage loss of material of stainless steel expansion joint, groundwater sump, and pipe component groups exposed internally to a moisture-laden air and/or an intermittently wetted environment using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

In the LRA, the applicant identified no aging effects for PVC and fiberglass pipe, and tubing components exposed internally and externally to raw water and seawater. Both PVC and fiberglass material are benign in this environment.

On the basis of its review of current industry research and operating experience, the staff finds that a raw/sea water environment does not have significant aging effect on materials like PVC and fiberglass. Therefore, the staff did not identify any concerns with the applicant's conclusions that there are no applicable aging effects requiring management for PVC and fiberglass in raw/sea water environment.

In the applicant's letter dated January 11, 2005, the applicant proposed to manage loss of material of the stainless steel for the groundwater underdrains storage tank exposed to atmosphere/weather environment using MPS AMP B2.1.24, "Tank Inspection Program." The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds management of loss of material for this component using the tank inspection program to be adequate.

3.3B.2.3.49 Reactor Plant Gaseous Drains - Aging Management Evaluation - Table 3.3.2-49 and Table 3.3.2-49a

The staff reviewed Table 3.3.2-49 of the LRA and Table 3.3.2-49a in the applicant's supplement, dated January 11, 2005, which summarized the results of AMR evaluations for the reactor plant gaseous drains system component groups.

In the LRA and the January 11, 2005, supplement, the applicant identified no aging effects for stainless steel components exposed to air, including flow indicators, pipe, pump, tubing, valves, containment drains transfer tank, and primary drains transfer tank component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Wrought austenitic stainless steel is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

In the LRA, the applicant proposed to manage cracking of stainless steel flow indicators, pipe, pump, tubing, and valves exposed internally to treated water using MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. However, the applicant identified Note E for these components and references Table 3.3.1, Item 3.3.1-15. The staff noted that Item 3.3.1-15 applies to loss of material aging effect and not cracking. The staff requested clarification for this reference. In response Audit Item 146 dated July 7, 2004, the applicant stated, that LRA Table 3.3.2-49 should not include entries in the 'NUREG-1801 Volume 2 Item' and 'Table 1 Item' columns for all line entries associated with the 'Cracking' aging effect. The Note for each 'Cracking' line entry should be "H." On the basis of its review, the staff finds the applicant's response acceptable.

Also, in the its January 11, 2005, letter, the applicant proposed to manage cracking of stainless steel containment drains transfer tank and the primary drains transfer tank exposed to internally to the environment of treated water using MPS AMP B2.1.25, "Work Control Process."

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. Visual inspections of the internal surfaces of plant components and plant commodities are performed during the performance of maintenance, in accordance with the work control process program, to determine the presence of loss of material. On the basis of its review, the staff finds that the work control process program is acceptable for managing loss of material due to general corrosion since visual inspections will be performed on internal surfaces of components to detect any sign of aging degradation.

3.3B.2.3.50 Sanitary Water - Aging Management Evaluation - Table 3.3.2-50

The staff reviewed LRA Table 3.3.2-50, which summarized the results of AMR evaluations for the sanitary water system component groups. In the LRA, the applicant identified no aging effects for cast iron and carbon steel components exposed to air, including pipe, and valves component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoors, or in an air-conditioned enclosure or room). Significant corrosion of cast iron and carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, cast iron and carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no applicable aging effects requiring management for metal in an air environment.

All other AMRs assigned to the staff in LRA Tables 3.3.2-1 through 3.3.2-50 were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, AERM, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the auxiliary systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the auxiliary systems, as required by 10 CFR 54.21(d).

3.4 Aging Management of Steam and Power Conversion System

3.4A Unit 2 Aging Management of Steam and Power Conversion System

This section of the SER documents the staff's review of the applicant's AMR results for the Unit 2 steam and power conversion components and component groups associated with the following systems:

- main steam system
- extraction steam system
- feedwater system
- condensate system
- condensate storage and transfer system
- condensate demin mixed bed system
- auxiliary feedwater system
- feedwater heater vents and drains system

- moisture separation and reheat system
- plant heating and condensate recovery system
- secondary chemical feed system
- turbine gland sealing system
- electro hydraulic control system
- turbine lube oil system
- exciter air cooler system
- stator liquid cooler system
- auxiliary steam reboiler and deaerating feedwater system

3.4A.1 Summary of Technical Information in the Application

In LRA Section 3.4, the applicant provided AMR results for steam and power conversion system components and component groups. In LRA Table 3.4.1, "Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for steam and power conversion system," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the steam and power conversion system components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.4A.2 Staff Evaluation

The staff reviewed LRA Section 3.4 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the steam and power conversion system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did determine that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.4A.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.4.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.4A.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.4A.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.4A.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the steam and power conversion system components.

Table 3.4A-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.4 that are addressed in the GALL Report.

Table 3.4A-1 Staff Evaluation for Steam and Power Conversion System in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Piping and fittings in main feedwater line, steam line, and auxiliary feedwater (AFW) piping (PWR only) (Item Number 3.4.1-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3A, Metal Fatigue
Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head, and shell (except main steam system) (Item Number 3.4.1-02)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry and one-time inspection	Chemistry control for secondary systems program (B2.1.6); Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.4A.2.2.2)
AFW piping (Item Number 3.4.1-03)	Loss of material due to general, pitting, and crevice corrosion, MIC and biofouling	Plant-specific		Not applicable (See Section 3.4A.2.2.3)
Oil coolers in AFW system (lubricating oil side possibly contaminated with water) (Item Number 3.4.1-04)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, and MIC	Plant-specific		Not applicable (See Section 3.4A.2.2.5)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
External surface of carbon steel components (Item Number 3.4.1-05)	Loss of material due to general corrosion	Plant-specific	General condition monitoring (B2.1.13)	Consistent with GALL, which recommends further evaluation (See Section 3.4A.2.2.4)
Carbon steel piping and valve bodies (Item Number 3.4.1-06)	Wall-thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	Flow-accelerated corrosion (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1)
Carbon steel piping and valve bodies in main steam system (Item Number 3.4.1-07)	Loss of material due to pitting and crevice corrosion	Water chemistry	Chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1)
Closure bolting in high-pressure or high-temperature systems (Item Number 3.4.1-08)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting integrity	Consistent with GALL (See Section 3.4A.2.1.2)
Heat exchangers and coolers/condensers by open-cycle cooling water (Item Number 3.4.1-09)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, MIC and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system		Not applicable. There are no in-scope components in the steam and power conversion systems that are serviced by Open-Cycle Cooling Water System.
Heat exchangers and coolers/condensers by closed-cycle cooling water (Item Number 3.4.1-10)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1.3)
External surface of aboveground condensate storage tank (Item Number 3.4.1-11)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground carbon steel tanks	Tank inspection program (B2.1.24)	Consistent with GALL, which recommends no further evaluation (See Section 3.4A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
External surface of buried condensate storage tank and AFW piping (Item Number 3.4.1-12)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection		Not applicable (See Section 3.4A.2.2.5)
External surface of carbon steel components (Item Number 3.4.1-13)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3); General condition monitoring (B2.1.13)	Consistent with GALL (See Section 3.4A.2.1.1)

The staff's review of the MPS steam and power conversion system and associated components followed one of several approaches. One approach, documented in Section 3.4A.2.1, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.4A.2.2, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.4A.2.3, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the steam and power conversion system components is documented in Section 3.0.3 of this SER.

3.4A.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Section 3.4.2.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the main steam, main feedwater, and emergency feedwater system components:

- boric acid corrosion program
- chemistry control for secondary systems program
- closed-cycle cooling water system program
- flow-accelerated corrosion program
- general condition monitoring program
- work control process program
- tank inspection program
- bolting integrity program

Staff Evaluation. In Tables 3.4.2-1 through 3.4.2-12 of the LRA, the applicant provided a summary of AMRs for the main feedwater, main steam, auxiliary feedwater, and blowdown system components and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.4A.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of Table 3.4.1, Item 13, of the LRA, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, “Boric Acid Corrosion” and AMP B2.1.13, “General Condition Monitoring.” The boric acid corrosion program includes specific inspections of steam and power conversion and supporting systems components. The boric acid corrosion program and the general condition monitoring program are evaluated in Sections 3.0.3.1 and 3.0.3.2 of this SER respectively.

The LRA identifies a borated water leakage environment for various components in the steam and power conversion and ESF systems and both the boric acid corrosion program and general condition monitoring program are credited with managing loss of material from external surfaces. The boric acid corrosion program described in LRA Section B2.1.3 appears to be limited to components located inside containment, as addressed in NUREG-1801, Section XI.M10. In RAI 3.4-1, the applicant was requested to clarify why the boric acid corrosion program is credited for managing boric acid corrosion in systems that are located outside containment. Also, in regard to the effectiveness of the general condition monitoring program, the applicant was requested to clarify:

- i) How the program manages loss of material for components not normally accessible.
- ii) The basis of the inspection frequency (once per refueling outage) considering the potential rate for material loss.
- iii) What acceptance criteria and corrective actions are applied to the visual indication of boric acid crystals without material degradation.
- iv) How the program provides for promptly identifying the specific cause and location of the borated water leakage.

In its response dated November 9, 2004, the applicant provided the following information:

> The Boric Acid Corrosion Program provides requirements to adequately manage boric acid related degradation of the reactor coolant system, ASME Class 1, 2 and 3 components, and associated or neighboring systems, structures, and components that are in the scope of License Renewal. The requirements of the Millstone Boric Acid Corrosion Program surpass the requirements listed in NUREG-1801, Section XI.M10, in that it is additionally applied to an identified boric acid system leak anywhere in the plant. As part of the Aging Management Review process, the Boric Acid Corrosion Program, along with the General Condition Monitoring Program, is credited for managing aging for the external surface of equipment located in a building that contains a boric acid liquid system (such as the Steam and Power Conversion system, the ESF system, and the Radwaste Ventilation system).

The General Condition Monitoring Program and the Boric Acid Corrosion Program are both listed for various components in the steam and power conversion, ESF, and radwaste ventilation systems because collectively they manage the loss of material for the external surfaces of these components. The General Condition Monitoring Program provides supplemental inspections to the Boric Acid Corrosion Program for managing loss of material due to boric acid corrosion in systems that are located outside containment, such as steam and power conversion, ESF, and radwaste ventilation systems. Any instances of boric acid leakage identified during general condition monitoring activities are entered into the corrective action program and evaluated using the guidance of the Boric Acid Corrosion Program.

The effectiveness questions identified are addressed by the Boric Acid Corrosion Program, not the General Condition Monitoring Program, since the Boric Acid Corrosion Program provides the evaluation and corrective actions when any evidence of boric acid leakage is identified. A more detailed answer is as follows:

i) Non-insulated components are examined by inspecting the accessible external surfaces for direct and indirect evidence of leakage. For components whose external surfaces are inaccessible for direct visual examination, the surrounding areas (including equipment surfaces located underneath the components) are examined for signs of leakage and other areas are considered where leakage may be channeled.

The Boric Acid Corrosion Program recognizes that boric acid leaks can travel down sloped piped or under insulation. Evidence of leakage can also be determined for components with vertical surfaces of insulation by examining the lowest elevation where the leakage may be detectable. Horizontal surfaces of insulation can be examined at insulation joints. When there is doubt as to a leak's origin, the evidence (i.e., accumulation of boric acid crystals) needs to be preserved until an evaluation has been performed to estimate the source, pathway, target and amount that may be affected. This includes the removal of insulation to determine the leak location.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the inspections in the General Condition Monitoring AMP and the Boric Acid Corrosion AMP. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once per ten years to verify the integrity of the equipment. Based on operating experience, there is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment.

ii) The Millstone Boric Acid Corrosion Program examines locations susceptible to boric acid leakage inside Containment during each refueling outage. It is not practical to perform these examinations while the reactor plant is operating.

Any boric acid leakage identified by plant personnel is either corrected prior to the end of the outage or is evaluated to ensure the intended function is maintained until a repair can be performed. Dominion is aware of the issues associated with boric acid corrosion, and the plant operating conditions that could be indicative of boric acid leakage. For potential boric acid corrosion leakage, which may develop between refueling cycles, changes in plant parameters would provide indication that a potential leak may exist. Both identified and unidentified leakage is strictly monitored and trended for changes in sump level, flow rates, and frequency of pump operation. Changes in ambient conditions inside containment also provide indication of potential boric acid leakage.

Abnormal ambient conditions inside containment are documented through the corrective action process, which may require a shutdown of the reactor plant in order to repair a leak inside containment. Plant operating experience indicates that boric acid inspections performed once per refueling cycle are adequate to maintain the intended function of the equipment in containment. Plant and industry operating experience indicates that a boric acid leak that starts during the operating cycle does not damage the equipment to the point where it cannot perform its intended function.

iii) In accordance with the Boric Acid Corrosion Program, any boric acid leakage identified by plant personnel (including boric acid crystals without material degradation) is documented through the corrective action process (10 CFR 50, Appendix B). Minor leakage may be just cleaned or, if leakage is more severe, a Boric Acid Corrosion Program assessment of the boric acid build-up is performed prior to clean-up. The leakage source, path, and target areas are located, and corrective actions are implemented as determined by the Boric Acid Corrosion Program. Corrective actions include timely repair of the leakage after detection to prevent or mitigate the extent of boric acid corrosion. Where evaluations are performed without repair or replacement, engineering analysis reasonably assures that the intended function is maintained consistent with the current licensing basis.

iv) The Boric Acid Corrosion Program provides for prompt identification of the specific cause and location of borated water leakage.

See response in item iii above.

Accessible areas are traversed on a daily basis by plant personnel who have been informed of expectations related to boric acid identification and corrective action. Personnel are expected to attempt to identify the leakage source as well as the extent of condition on secondary plant equipment. The Corrective Action Process triggers an investigation by the Boric Acid Corrosion Program. Minor boric acid may be just cleaned, more substantial leakage requires equipment to be repaired to stop the leak or an engineering evaluation be performed to ensure the intended function of the equipment is maintained until such a time that the leak can be repaired.

The staff reviewed the applicant's response and determined that the response was reasonable and acceptable because the applicant credits a combination of the general condition monitoring program and the boric acid corrosion program to detect and evaluate borated water leakage and boric acid corrosion to maintain the intended function of the auxiliary system components. For areas outside containment, general equipment (or materials) frequent inspections are performed as often as daily, which would identify any borated water leakage and any required subsequent evaluation. In response to staff's request of RAI 3.3-B-1, the applicant committed to the following clarification to the Unit 2 Appendix A "FSAR Supplement," Section A2.1.3, Boric Acid Corrosion, Program Description and the Unit 3 Appendix A "FSAR Supplement," Section A2.1.2, Boric Acid Corrosion, Program Description. (Refer to Section 3.3A for additional details.)

3.4A.2.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In the discussion section of Table 3.4.1, Item 8, of the LRA, the applicant stated that loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or stress corrosion cracking (SCC), for closure bolting in high-pressure or high-temperature systems components, in the steam and power conversion systems are not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in steam and power conversion systems is not identified as an aging effect requiring management. However, SRP-LR Table 3.4-1 stipulates that the AMR evaluations consider crack initiations and growth due to cyclic loading for components closure bolting in high pressure or hi-temperature systems and that the applicant could manage the aging effects via GALL AMP XI.M18, "Bolting Integrity."

The applicant stated in the LRA, that SCC is an aging mechanism that requires the simultaneous action of a corrosive environment, a sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate the susceptibility to SCC. Further, the applicant states that steam and power conversion systems bolting is fabricated to ASTM A194, Grade B7 standard, is not high yield strength (>150 ksi), and is not subjected to adverse environment that could result in SCC. Therefore, cracking is not an aging effect requiring management.

The staff noted that SCC could occur in corrosive environment and that the environment does not have to be in a wetted condition. The staff questioned the applicant whether the good bolting practices, bolting preload considerations, and proper sealant and lubricant, as stated in NUREG-1339, are followed. By letter dated December 3, 2004, the applicant submitted its LRA supplement. In its response, the applicant stated that it has developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is addressed in Section 3.0.3.2.18 of this SER.

By supplement dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaces the existing information in the "Discussion" column of LRA Table 3.4.1, Item 8 with "consistent with the NUREG-1801." The staff reviewed the applicant's response and the staff finds this acceptable because it is consistent with the GALL Report.

3.4A.2.1.3 Loss of Material Due to General (Carbon Steel Only) Pitting and Crevice Corrosion

In the discussion section of LRA Table 3.4.1, Item 10, the applicant stated that for components in a treated water environment other than closed-cycle cooling water, loss of material is managed by the chemistry control for secondary systems or the work control process.

The GALL Report identifies that further evaluation is required for components managed by water chemistry program in the steam and power conversion system. During the audit and review, the staff requested that the applicant provide clarification of how those components that are managed by the chemistry control program do not require further evaluation.

By supplement dated November 9, 2004, the applicant stated that GALL Report, Item VIII.E.4-a, which references GALL AMP XI.M2, “Water Chemistry,” should have been chosen for these components, along with a Note D to indicate that the component is different than the component described in the NUREG-1801. The further evaluation recommended, associated with GALL Report Item VIII.E.4-a in LRA Table 3.4.1, Item 3.4.1-02, is addressed in LRA Section 3.4.2.2.2.

The applicant also stated in the LRA, that the effectiveness of AMP B2.1.6, “Chemistry Control for Secondary Systems Program” is confirmed by AMP B2.1.25, “Work Control Process.” The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if and when aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for secondary systems program. The staff finds the applicant’s response acceptable and to be consistent with the GALL Report.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in the LRA Table 3.4.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further staff review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.4.2.2 of the LRA, the applicant provides further evaluation of aging management as recommended by the GALL Report for steam and power conversion system. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage

- loss of material due to general, pitting, and crevice corrosion
- loss of material due to general, pitting, and crevice corrosion, microbiologically influenced corrosion, and biofouling
- general corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion
- quality assurance for aging management of non-safety-related components

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.4.2.2 of the Standard Review Plan for License Renewal. Details of the staff's audit review are documented in the staff's audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections of this SER.

3.4A.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.4A.2.2.2 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion

In LRA Section 3.4.2.2.2, the applicant addressed loss of material due to general (carbon steel only), pitting, and crevice corrosion that could occur in the carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes.

SRP-LR Section 3.4.2.2.2 states that management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in EPRI guideline TR-102134 for secondary water chemistry to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, “Water Chemistry,” and GALL AMP XI.M32, “One Time Inspection,” for management of this aging effect.

The applicant stated in the LRA that the loss of material due to general corrosion, pitting, and crevice corrosion in the steam and power conversion system components is managed by control of water chemistry through MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.” The applicant also stated that in lieu of a one-time inspection, MPS AMP B2.1.25, “Work Control Process,” is used to provide confirmation of the effectiveness of the chemistry control for secondary systems program. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis and provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of the condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for secondary systems program.

The staff reviewed the chemistry control for secondary systems and its evaluation is documented in Section 3.0.3.2.3 of this SER. In addition, in response to the staff’s query regarding the one-time inspection, the applicant stated that the work control process program provides more opportunities for inspection of signs of aging than would a one-time inspection program. In addition, it provides confirmation of chemistry control effectiveness on a continuing basis, rather than a single point in time afforded by a one-time inspection program. The applicant confirmed that indications of age-related degradation would be evaluated and the extent of the condition be determined through the corrective action system. Enhancements to water chemistry control programs and follow-up inspections would be initiated, as necessary, to provide effective management of aging effects.

The staff reviewed the information provided in the LRA and concurs that the applicant’s approach is consistent with GALL AMP XI.M32, “One-time Inspection,” which states: “An alternate acceptable program may include routine maintenance or a review of repair records to confirm that these components have been inspected for aging degradation and significant aging degradation has not occurred and thereby verify the effectiveness of the existing AMPs.” Also, the staff reviewed operating experience associated with the work control process program as it applied to the steam and power conversion system, specifically, the applicant’s technical report on work control inspection opportunities which provided the results of a plant-wide review of maintenance history for a 10-year period. The staff finds that more than 50 work control related inspection opportunities were listed against the steam and power conversion system, which the staff found to be more than adequate to provide confirmation of the effectiveness of the chemistry control for secondary systems program.

3.4A.2.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

In LRA Section 3.4.2.2.3, the applicant addressed local loss of material due to general, pitting, and crevice corrosion, MIC and biofouling that could occur in carbon steel piping and fittings for untreated water from the backup water supply in the auxiliary feedwater system.

SRP-LR Section 3.4.2.2.3 states that loss of material due to general corrosion, pitting and crevice corrosion, MIC, and biofouling could occur in carbon steel piping and fittings for untreated water from the backup water supply in the PWR auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1, of the standard review plan).

The applicant stated in LRA Section 3.4.2.2.3 that the backup water supply for the auxiliary feedwater system is the Unit 2 fire protection system. The backup water source is maintained isolated from the auxiliary feedwater system by two normally closed valves. A tell-tale drain valve between the two closed valves is left open to ensure that leakage past the closed valves can be detected, thus ensuring that untreated water from the fire protection system does not enter the auxiliary feedwater pumps suction piping. The applicant also stated that the backup water supply piping and components were evaluated to be satisfactory for the effects of aging with the Unit 2 fire protection system.

During the audit and review, the staff reviewed Unit 2 piping and instrumentation diagram and found that there was effective isolation to ensure that untreated water from the fire protection system does not enter the auxiliary feedwater pumps suction piping.

Since the untreated water environment is isolated from the auxiliary feedwater pumps suction piping, this aging effect is not applicable to auxiliary feedwater pumps suction piping. On this basis, the staff concludes that not including this aging effect is acceptable.

3.4A.2.2.4 Loss of Material Due to General Corrosion

In LRA Section 3.4.2.2.4, the applicant addressed loss of material due to general corrosion that could occur on the external surfaces of all carbon steel SCs, including closure boltings, exposed to operating temperature less than 212°F.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including closure boltings, exposed to operating temperature less than 212°F. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed.

The applicant stated in the LRA that general corrosion is applicable to carbon steel, low-alloy steel, and cast iron components in an air environment only when it is exposed to intermittent wetting. The applicant also stated that loss of material due to general corrosion of external surfaces is managed by MPS AMP B2.1.13, “General Condition Monitoring.”

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. On the basis of its review, the staff concludes that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

3.4A.2.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

In LRA Section 3.4.2.2.5, the applicant addressed the loss of material due to general, pitting, crevice and microbiologically influenced corrosion that could occur in the stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the auxiliary feedwater system and in the underground piping and fittings and emergency condensate storage tank in the auxiliary feedwater system and the underground condensate storage tank in the condensate system.

The applicant stated in LRA Sections 3.4.2.2.5.1 and 3.4.2.2.5.2 that the auxiliary feedwater pumps are not equipped with oil coolers and that there are no underground, carbon steel components associated with the auxiliary feedwater system, and therefore, this item is not applicable.

SRP-LR Section 3.4.2.2.5 addresses loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, and MIC which could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

SRP-LR 3.4.2.2.5 also addresses loss of material due to general corrosion, pitting and crevice corrosion, and MIC, which could occur in underground piping and fittings and emergency condensate storage tank in the auxiliary feedwater system and the underground condensate storage tank in the condensate system.

On the basis that the auxiliary feedwater pumps are not equipped with oil coolers and that there are no buried components in the steam and power conversion systems, the staff concurs with the applicant and finds that this aging effect is not applicable.

3.4A.2.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff's evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.4.2-1 through 3.4.2-12 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report or are not addressed in the GALL Report. The staff also reviewed additional systems and components, provided by LRA supplement letters dated November 9, 2004; December 3, 2004;

and the applicant's letter dated January 11, 2005. In Tables 3.4.2-1 through 3.4.2-12, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB during the period of extended operation.

The staff evaluation is discussed below.

3.4A.2.3.1 Main Steam - Aging Management Evaluation - Table 3.4.2-1 and 3.4.2-1a

The staff reviewed Table 3.4.2-1 of the LRA and Table 3 3.4.2-1a of the supplement dated January 11, 2005, which summarized the results of AMR evaluations for the main steam system component groups.

In LRA Table 3.4.2-1, the applicant identified no aging effects for the following carbon steel, and low alloy steel main steam component types exposed externally to air: condensing pots, moisture separators/reheaters (shell), pipe, steam traps, strainers, turbine casings, valves (atmospheric dumps and main steam safety/relief), and steam generator blowdown tank.

During the audit and review, the staff requested that the applicant provide clarification as to why there are no aging effects for these components. The applicant stated that the steam and power conversion systems components are normally operated at high temperatures (> 212 °F) and the external surface of the component was determined to be dry. The applicant also stated that these components are located inside buildings and because of the high operating temperature, would not be subject to condensation. These components were determined not to be susceptible to loss of material due to corrosion based on the dry environment, as described in LRA Appendix C, Section C3.7.15.

The staff expressed concern regarding possible long-term shutdown such as the plant shutdown in the 1990s. The applicant stated that the only potential source of wetting of the external surfaces for these components, in a sheltered environment, is condensation. However, intermittent wetting conditions would not be expected during out-of-service periods for these components because for condensation to occur, the surface temperature of the components would have to decrease below the dew point of the ambient environment. These normally high temperature components are located in buildings with warm to hot temperatures and they are insulated. Therefore, conditions for condensation are not expected even when the components are out-of-service for long periods of time.

Since the external surface temperature for these main steam system components is high enough to preclude condensation and these components are not exposed to the intermittent wetting, the staff finds there are no applicable aging effects for the above-mentioned components.

In LRA Table 3.4.2-1, the applicant also identified no aging effects for the following stainless steel main steam component types exposed externally to air: expansion joints, flexible hoses, flow elements, flow orifices, tubing, and valves.

On the basis of current industry research and operating experience, stainless steel exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for stainless steel components in an air environment.

In LRA Table 3.4.2-1, the applicant proposed to manage loss of material and cracking for the following stainless steel main steam component types - expansion joints, flexible hoses, flow elements, flow orifices, valves and tubing - exposed internally to treated water and steam using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The applicant also proposed to manage cracking for the following stainless steel main steam component types - quench tank heat exchangers (tubes and tubesheet) - exposed internally and externally to treated water using AMP B2.1.6, “Chemistry Control for Secondary Systems” and AMP B2.1.7, “Closed-cycle Cooling Water System.” The staff reviewed the chemistry control for secondary systems program and closed-cycle cooling water system program and its evaluation of these programs is documented in Sections 3.0.3.2.3 and 3.0.3.2.4 of this SER, respectively. The effectiveness of the chemistry control program is further provided by MPS AMP B2.1.25, “Work Control Process,” and is documented in Section 3.0.3.3.4 of this SER.

On the basis of its review, and because the effects of pitting and crevice corrosion on stainless steel is not expected to be significant in treated water or steam, the staff finds that management of loss of material for stainless steel components using the chemistry control for secondary systems and closed-cycle cooling water system AMP is adequate.

The applicant stated in the LRA that stress corrosion cracking is an aging mechanism that requires the simultaneous action of a corrosion environment, a sustained stress, and a susceptible material. The applicant also stated that elimination of any one of these elements will eliminate the susceptibility to stress corrosion cracking. The applicant credits MPS AMP B2.1.6, “Chemistry Control for Secondary Systems,” to manage this aging mechanism since it removed one of the three required actions.

Since the chemistry control program for secondary systems maintains a controlled environment with low contaminant concentration and the applicant’s operating experience has shown this program to be effective for the management of cracking due to stress corrosion cracking, the staff finds that management of stress corrosion cracking for stainless steel components using chemistry control for secondary systems is adequate.

In LRA Table 3.4.2-1, the applicant proposed to manage loss of material for carbon steel main steam component type - silencers - exposed internally to air, with MPS AMP B2.1.25, “Work Control Process.”

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds the work control process program acceptable for managing the aging effect of loss of material for the carbon steel silencer.

3.4A.2.3.2 Extraction Steam - Aging Management Evaluation - Table 3.4.2-2

The staff reviewed Table 3.4.2-2 of the LRA, which summarized the results of AMR evaluations in the SRP-LR for the extraction steam system component groups.

In Unit 2 LRA Table 3.4.2-2, the applicant proposed to manage loss of material and cracking for the following stainless steel extraction steam system component types - expansion joints, and tubing - exposed internally to steam, using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for extraction steam components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

The applicant identified no aging effects for the following carbon low-alloy steel extraction steam system component types - pipe, steam traps, strainers, and valves - exposed externally to air. On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these carbon low-alloy steel components exposed externally to air. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

3.4A.2.3.3 Feedwater - Aging Management Evaluation - Table 3.4.2-3

The staff reviewed LRA Table 3.4.2-3, which summarized the results of AMR evaluations for the feedwater system component groups.

In Unit 2 LRA Table 3.4.2-3, the applicant proposed to manage loss of material and cracking for the following stainless steel feedwater system component types - flow elements, flow orifices, and tubing - exposed internally to steam using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for feedwater components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

In Unit 2 LRA Table 3.4.2-3, the applicant proposed to manage loss of material for the carbon steel feedwater system pumps exposed internally to treated water using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems” and MPS AMP B2.1.25, “Work Control Process.”

The GALL Report recommends GALL AMP XI.M2, “Water Chemistry,” to be augmented by verifying the effectiveness of water chemistry control by a supplementary program. GALL AMP XI.M32, ”One-Time Inspection” is an acceptable verification program.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The effectiveness of the chemistry control program is provided further by MPS AMP B2.1.25, “Work Control Process,” and is documented in Section 3.0.3.3.4 of this SER. The staff determined that the applicant’s work control process program is an acceptable alternate inspection program for this component to manage the aging effects.

The applicant identified no aging effects for the following carbon steel feedwater system component types exposed externally to air: heaters (feedwater heater channel head), and heaters (feedwater heater shell).

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these carbon steel components exposed externally to air. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

3.4A.2.3.4 Condensate - Aging Management Evaluation - Table 3.4.2-4

The staff reviewed LRA Table 3.4.2-4, which summarized the results of AMR evaluations for the condensate system component groups.

In LRA Table 3.4.2-4, the AMR for rubber expansion joints is reviewed by the staff and its evaluation is documented in Section 3 of this SER.

In LRA Table 3.4.2-4, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel/cast iron condensate system component types exposed externally to air: flow elements, flow orifices, tubing, condensers (main condenser shell), drain coolers (channel head), drain coolers (shell), heat exchanger steam jet air ejectors (shell), heaters (feedwater heater channel head), heaters (feedwater heater shell), pipe, steam packing exhauster (channel head), steam packing exhauster (shell), valves, and pumps.

On the basis that these have the same previously discussed MEAP combination as the main steam components, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel/cast iron components exposed externally to air. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-4, the applicant proposed to manage loss of material and cracking for stainless steel condensate system component types - flow elements, flow orifices, and tubing - exposed internally to treated water using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for condensate components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

The LRA Table 3.4.2-4 credits the AMP B2.1.25, “Work Control Process,” to manage the change in material properties and cracking of rubber in various expansion joints in a treated water environment. The applicant has identified no aging effect for these expansion joints in an external air environment. The work control process AMP described in LRA Section B2.1.25 does not identify specific criteria unique to managing rubber expansion joints, and it is not clear how external visual inspections will manage internal degradation. In RAI 3.4-3 the staff requested the applicant to clarify how visual inspection of the external surfaces of the expansion joints is adequate to detect internal cracking prior to loss of the component pressure boundary function. In addition to visual inspections, the applicant was requested to clarify if other testing methods will be used, such as hardness testing to determine change of material properties. The applicant was also requested to Identify any operating experience pertaining to rubber expansion joint inspections to demonstrate the effectiveness of the work control process program to manage cracking and change in material properties in rubber expansion joints exposed to treated water and external air.

In its response dated November 9, 2004, the applicant stated:

> There are no external aging effects applicable to these expansion joints. In addition, there are no external visual inspections credited for management of internal aging effects of the expansion joints. The Work Control Process aging management of internal aging referenced in LRA Table 3.4.2-4 for these expansion joints uses internal inspections to detect signs of aging as described in LRA Appendix B Section B2.1.25. Maintenance activities performed in accordance with the Work Control Process provide opportunities to visually inspect the internal surfaces of these components.
>
> Internal cracking and change of material properties for these elastomer components are visually observable by such conditions as evidence of cracking and crazing, discoloration, distortion, evidence of swelling, tackiness, evaluation of resiliency and indentation recovery, etc.
>
> Millstone Unit 2 commitment item 25 (and commitment item 26 for Millstone Unit 3) identified in LRA Appendix A, Table A6.0-1, provides for changes to maintenance and work control procedures to ensure inspections are appropriately and consistently performed.
>
> A review of operating experience associated with these expansion joints indicates that degradation is observable through the Work Control Process activities. Conditions such as cracking and swelling have been noted resulting in replacement of the affected expansion joints.
>
> Therefore, the Work Control Process manages the internal aging effects of the expansion joints to provide reasonable assurance that the intended function will be maintained.

The staff finds the applicant’s response reasonable and acceptable, because the applicant has committed to make changes to maintenance and work control procedures to ensure inspections are appropriately and consistently performed to detect degradation prior to loss of component function.

3.4A.2.3.5 Condensate Storage and Transfer - Aging Management Evaluation - Table 3.4.2-5

The staff reviewed LRA Table 3.4.2-5, which summarized the results of AMR evaluations for the condensate storage and transfer system component groups.

In LRA Table 3.4.2-5, the AMR for the carbon steel and low alloy steel condensate storage tank and the stainless steel rupture disks exposed internally to gas is reviewed the staff and its evaluation is documented in Section 3 of this SER.

In LRA Table 3.4.2-5, the AMR for the stainless steel rupture disks exposed externally to atmosphere/weather is reviewed by the staff and its evaluation is documented in Section 3 of this SER.

In LRA Table 3.4.2-5, the applicant identified no aging effects for stainless tubing exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for this stainless component exposed externally to air. The staff's evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-5, the applicant proposed to manage loss of material for carbon steel and low-alloy steel pipe exposed externally to an atmosphere/weather environment with MPS AMP B2.1.13, "General Condition Monitoring."

The staff reviewed the general condition monitoring program and its evaluation is documented in 3.0.3.3.2. The staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

3.4A.2.3.6 Condensate Demin Mixed Bed - Aging Management Evaluation - Table 3.4.2-6

The staff reviewed LRA Table 3.4.2-6, which summarized the results of AMR evaluations for the condensate demin mixed bed system component groups.

In LRA Table 3.4.2-6, the applicant identified no aging effects for stainless steel tubing exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for this stainless component exposed externally to air. Its evaluation is documented in Section 3.4A.2.3.1 of this SER.

3.4A.2.3.7 Auxiliary Feedwater - Aging Management Evaluation - Table 3.4.2-7

The staff reviewed LRA Table 3.4.2-7, which summarized the results of AMR evaluations for the auxiliary feedwater system component groups.

In the LRA Table 3.4.2-7, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel auxiliary feedwater system component types exposed externally to air: flow elements, flow orifices, tubing, and turbine casing.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel component exposed externally to air. The staff's evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-7, the applicant proposed to manage loss material for the carbon steel and low-alloy steel turbine casing exposed internally to treated water and steam environment using AMP B2.1.6, "Chemistry Control for Secondary Systems" and AMP B2.1.25, "Work Control Process."

The staff reviewed the chemistry control for secondary systems program and the work control process and its evaluation is documented in Sections 3.0.3.2.3 and 3.0.3.3.4 of this SER, respectively. The chemistry control program purposes to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The work control process ensures effectiveness of the water chemistry control for secondary systems. On this basis, the staff finds that management of loss of material for this component is adequate.

3.4A.2.3.8 Feedwater Heater Vents and Drains - Aging Management Evaluation - Table 3.4.2-8

The staff reviewed LRA Table 3.4.2-8, which summarized the results of AMR evaluations for the feedwater heater vents and drains system component groups.

In LRA Table 3.4.2-8, the applicant proposed to manage cracking for stainless steel feedwater heater vents and drains system component types - expansion joints, flow elements, flow orifices, restricting orifices, tubing, and valves - exposed internally to a treated water and steam environment using AMP B2.1.6, "Chemistry Control for Secondary Systems Program."

The MEAP for feedwater heater vents and drains components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using chemistry control for secondary systems program is adequate. The staff's evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-8, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel feedwater heater vents and drains system component types - condensing pots, expansion joints, flow elements, flow orifices, heater drains tank, level indicators, pipe, pumps, restricting orifices, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-8, the applicant proposed to manage loss of material for the copper alloy gland seal coolers (coils) exposed internally and externally to a treated water environment using AMP B2.1.6, "Chemistry Control for Secondary Systems," and AMP B2.1.25, "Work Control Process."

The staff reviewed the chemistry control for secondary systems program and the work control process and its evaluation is documented in Sections 3.0.3.2.3 and 3.0.3.3.4 of this SER, respectively. The chemistry control program purposes to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The work control process ensures effectiveness of the water chemistry control for secondary systems and provides opportunity to inspect the outside surface of the cooler coils. On this basis, the staff finds that management of loss of material for this component is adequate.

3.4A.2.3.9 Moisture Separation and Reheat - Aging Management Evaluation - Table 3.4.2-9

The staff reviewed LRA Table 3.4.2-9, which summarized the results of AMR evaluations for the moisture separation and reheat system component groups.

In LRA Table 3.4.2-9, the applicant proposed to manage loss of material/cracking for stainless steel moisture separation and reheat system component types - condensing pots, drains pots, flow elements, and tubing - exposed internally to treated water and steam environment using MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The MEAP for moisture separation and reheat components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-9, the applicant identified no aging effects for stainless steel/carbon steel/low-alloy steel moisture separation and reheat system component types exposed externally to air: condensing pots, drains pots, drain tanks, flow elements, tubing, and valves.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff’s evaluation is documented in Section 3.4.2.3.1 of this SER.

3.4A.2.3.10 Plant Heating and Condensate Recovery - Aging Management Evaluation - Table 3.4.2-10

The staff reviewed LRA Table 3.4.2-10, which summarized the results of AMR evaluations for the plant heating and condensate recovery system component groups.

In LRA Table 3.4.2-10, the applicant proposed to manage loss of material for copper alloys plant heating and condensate recovery system component types - heating and ventilation Units(coils), and heating coils - exposed internally to a steam environment using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER. The chemistry control program purposes to provide reasonable assurance that water quality is compatible with the materials of construction in the plant systems and equipment in order to minimize loss of material. The work control process ensures effectiveness of the water chemistry control for secondary systems. On this basis, the staff finds that management of loss of material for this component is adequate.

In LRA Table 3.4.2-10, the applicant proposed to manage loss of material for the copper alloys plant heating and condensate recovery system sample coolers (tubes) exposed internally and externally to a treated water environment using AMP B2.1.25, "Work Control Process" and AMP B2.1.7, "Closed-cycle Cooling Water System."

The staff reviewed the work control process program and the closed-cycle cooling water system program. Its evaluation of these programs is documented in Sections 3.0.3.3.4 and 3.0.3.2.4 of this SER, respectively. The closed-cooling water system program monitors chemical parameters and provides inspection to further verify the chemistry control. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the staff finds that the management of loss material for these components is adequate.

In LRA Table 3.4.2-10, the applicant proposed to manage loss of material for carbon steel and low-alloy steel plant heating and condensate recovery system type components - pipe, reservoir, and steam traps - exposed externally to the atmosphere/weather environment using MPS AMP B2.1.13, "General Condition Monitoring."

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

In the LRA Table 3.4.2-10, the applicant proposed to manage cracking for the stainless steel tubing exposed internally to a treated water and steam environment using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for plant heating and condensate recovery components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that the management of cracking for stainless steel components using chemistry control for secondary systems program to be adequate. The staff's evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-10, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy plant heating and condensate recovery system component types - pipe, sample traps, strainers, tubing and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these steel/carbon steel/low-alloy components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

3.4A.2.3.11 Secondary Chemical Feed - Aging Management Evaluation - Table 3.4.2-11

The staff reviewed LRA Table 3.4.2-1, which summarized the results of AMR evaluations for the secondary chemical feed system component groups.

In LRA Table 3.4.2-11, the applicant proposed to manage cracking for stainless steel secondary chemical feed system type components - tubing and valves - exposed internally to a treated water environment using AMP 2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for secondary chemical feed components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The project team’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-11, the applicant identified no aging effects for stainless steel secondary chemical feed system type components - tubing and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel components exposed externally to air. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

3.4A.2.3.12 Turbine Gland Sealing - Aging Management Evaluation - Table 3.4.2-12

The staff reviewed LRA Table 3.4.2-12, which summarized the results of AMR evaluations for the turbine gland sealing system component groups.

In LRA Table 3.4.2-12, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel turbine gland sealing system type components - flow orifices, pipe, tubing, valves, and water pot - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the project teams finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff’s evaluation is documented in Section 3.4A.2.3.1 of this SER.

In LRA Table 3.4.2-12, the applicant proposed to manage cracking and loss of material for stainless steel turbine gland sealing system type components - flow orifices, tubing, and valves - exposed internally to a steam environment using AMP B2.1.6, “Chemistry Control for Secondary Systems.”

The material, environment, aging effects, and aging management program (MEAP) for turbine gland sealing components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of cracking and loss of material for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

3.4A.2.3.13 Table 5: Steam and Power Conversion System - Auxiliary Steam Reboiler and Deaerating Feedwater - Aging Management Evaluation

In the LRA supplement letter of November 9, 2004, the applicant identified no aging effects for carbon steel and low-alloy steel exposed to an air environment for the auxiliary steam feedwater surge tank, pipe, and valve component types.

On the basis of current industry research and operating experience, carbon steel and low-alloy steel exposed air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for carbon steel and low-alloy steel components in an air environment.

3.4A.2.3.14 Table 6: Steam and Power Conversion System - Exciter Air Cooler - Aging Management Evaluation

In the LRA supplement letter of November 9, 2004, the applicant stated that loss of material of main transfomer and generator isophase bus duct cooling exchangers (coils) of copper alloys exposed to air and treated water environment in the exciter air cooler system is managed using AMP B.2.1.25, “Work Control Process.”

The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the project team finds that the management of loss material for these components is adequate.

3.4A.2.3.15 Table 7: Steam and Power Conversion System - Stator Liquid Cooler - Aging Management Evaluation

In the LRA supplement letter of November 9, 2004, the applicant stated that loss of material of tubing and valve of stainless steel exposed to moisture-laden air or intermittent wetted environment in the stator liquid cooler is managed using AMP B.2.1.13, “General Condition Monitoring.”

The staff reviewed the general condition monitoring and its evaluation is documented in Section 3.0.3.3.2 of this SER. The staff finds that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

3.4A.2.3.16 Table 8: Steam and Power Conversion System - Turbine Lube Oil- Aging Management Evaluation

In the LRA supplement dated November 9, 2004, the applicant identified no aging effects for stainless steel exposed to air, including pipe, tubing, and valve component types.

On the basis of current industry research and operating experience, stainless steel exposed externally to air are not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for stainless steel components in an air environment.

In the LRA supplement dated November 9, 2004, the applicant stated that cracking of pipe, tubing and valves of stainless steel exposed to oil environment in the turbine lube oil is managed using AMP B.2.1.25, “Work Control Process.”

The staff reviewed the work control process and its evaluation is documented in Section 3.0.3.3.4 of this report. The work control process program performs maintenance activities to provide visual inspection and tracks the performance of inspection and surveillance activities. On this basis, the staff finds that the management of cracking for these components is adequate.

All other AMRs assigned in Tables 3.4.2-1 through 3.4.2-12 of the LRA the LRA supplements were evaluated. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the steam and power conversion components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the steam and power conversion, as required by 10 CFR 54.21(d).

3.4B Unit 3 Aging Management of Steam and Power Conversion System

This section of the SER documents the staff's review of the applicant's AMR results for the Unit 3 steam and power conversion components and component groups associated with the following systems:

- main steam system
- feedwater system
- condensate make-up and draw-off system
- steam generator blowdown system
- auxiliary feedwater system
- auxiliary steam system
- auxiliary boiler condensate and feedwater system
- hot water heating system
- hot water pre-heating system
- steam generator chemical addition system
- turbine plant miscellaneous drains system

3.4B.1 Summary of Technical Information in the Application

In LRA Section 3.4, the applicant provided AMR results for steam and power conversion system components and component groups. In LRA Table 3.4.1, "Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the steam and power conversion system components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.4B.2 Staff Evaluation

The staff reviewed LRA Section 3.4 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the steam and power conversion system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Detail of the staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.4B.2.1 of this SER.

The staff also performed an audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.4.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.4B.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not addressed in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.4B.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the steam and power conversion system components.

Table 3.4B-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.4 that are addressed in the GALL Report.

Table 3.4B-1 Staff Evaluation for Steam and Power Conversion System in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Piping and fittings in main feedwater line, steam line, and auxiliary feedwater (AFW) piping (PWR only) (Item Number 3.4.1-01)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3B, Metal Fatigue
Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head, and shell (except main steam system) (Item Number 3.4.1-02)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry and one-time inspection	Chemistry control for secondary systems program (B2.1.6); Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.4B.2.2.2)
AFW piping (Item Number 3.4.1-03)	Loss of material due to general, pitting, and crevice corrosion, MIC and biofouling	Plant-specific		Not applicable (See Section 3.4B.2.2.3)
Oil coolers in AFW system (lubricating oil side possibly contaminated with water) (Item Number 3.4.1-04)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, and MIC	Plant-specific	Work control process (B2.1.25)	Consistent with GALL, which recommends further evaluation (See Section 3.4B.2.2.5)
External surface of carbon steel components (Item Number 3.4.1-05)	Loss of material due to general corrosion	Plant-specific	General condition monitoring (B2.1.13)	Consistent with GALL, which recommends further evaluation (See Section 3.4B.2.2.4)
Carbon steel piping and valve bodies (Item Number 3.4.1-06)	Wall-thinning due to Flow-accelerated corrosion	Flow-accelerated corrosion	Flow-accelerated corrosion (B2.1.11)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)
Carbon steel piping and valve bodies in main steam system (Item Number 3.4.1-07)	Loss of material due to pitting and crevice corrosion	Water chemistry	Chemistry control for secondary systems program (B2.1.6)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Closure bolting in high-pressure or high-temperature systems (Item Number 3.4.1-08)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	Bolting integrity	Consistent with GALL (See Section 3.4B.2.1.2)
Heat exchangers and coolers/condensers by open-cycle cooling water (Item Number 3.4.1-9)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, MIC and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	Work control process (B2.1.25)	Not applicable (See Section 3.4B.2.1.3)
Heat exchangers and coolers/condensers by closed-cycle cooling water (Item Number 3.4.1-10)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-cycle cooling water system	Closed-cycle cooling water system (B2.1.7)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1.4)
External surface of aboveground condensate storage tank (Item Number 3.4.1-11)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground carbon steel tanks	Tank Inspection Program (B2.1.24)	Consistent with GALL, which recommends no further evaluation (See Section 3.4B.2.1)
External surface of buried condensate storage tank and AFW piping (Item Number 3.4.1-12)	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection		Not applicable (See Section 3.4B.2.2.5)
External surface of carbon steel components (Item Number 3.4.1-13)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3); General condition monitoring (B2.1.13)	Consistent with GALL (See Sections 3.4B.2.1.1)

The staff's review of the MPS steam and power conversion system and associated components followed one of several approaches. One approach, documented in Section 3.4B.2.1, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.4B.2.2, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.4B.2.3, involves the staff's review of the AMR results for components in the steam and power conversion system that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the steam and power conversion system components is documented in Section 3.0.3 of this SER.

3.4B.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Section 3.4.2.1 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the steam and power conversion system components:

- boric acid corrosion program
- buried pipe inspection program
- chemistry control for secondary systems program
- closed-cycle cooling water system program
- flow-accelerated corrosion program
- general condition monitoring program
- tank inspection program
- work control process program
- bolting integrity program

Staff Evaluation. In Tables 3.4.2-1 through 3.4.2-11 of the LRA, the applicant provided a summary of AMRs for the main feedwater, main steam, auxiliary feedwater, and blowdown system components and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.4B.2.1.1 Loss of Material Due to Boric Acid Corrosion

In the discussion section of Table 3.4.1, item 13, of the LRA, the applicant stated that loss of material due to boric acid corrosion is managed by MPS AMP B2.1.3, "Boric Acid Corrosion," and MPS AMP B2.1.13, "General Condition Monitoring." The boric acid corrosion program includes specific inspections of steam and power conversion and supporting systems components. The boric acid corrosion program and the general condition monitoring program are evaluated in Sections 3.0.3.1 and 3.0.3.2 of this SER respectively.

The LRA identifies a borated water leakage environment for various components in the steam and power conversion and ESF systems and both the boric acid corrosion program and general condition monitoring program are credited with managing loss of material from external surfaces. The boric acid corrosion program described in LRA Section B2.1.3 appears to be limited to components located inside containment, as addressed in NUREG-1801, Section XI.M10. In RAI 3.4-1, the applicant was requested to clarify why the boric acid corrosion program is credited for managing boric acid corrosion in systems that are located outside containment. Also, in regard to the effectiveness of the general condition monitoring program, the applicant was requested to clarify:

i) How the program manages loss of material for components not normally accessible.
ii) The basis of the inspection frequency (once per refueling outage) considering the potential rate for material loss.
iii) What acceptance criteria and corrective actions are applied to the visual indication of boric acid crystals without material degradation.
iv) How the program provides for promptly identifying the specific cause and location of the borated water leakage.

In its response dated November 9, 2004, the applicant provided the following information:

> The Boric Acid Corrosion Program provides requirements to adequately manage boric acid related degradation of the reactor coolant system, ASME Class 1, 2 and 3 components, and associated or neighboring systems, structures, and components that are in the scope of License Renewal. The requirements of the Millstone Boric Acid Corrosion Program surpass the requirements listed in NUREG-1801, Section XI.M10, in that it is additionally applied to an identified boric acid system leak anywhere in the plant. As part of the Aging Management Review process, the Boric Acid Corrosion Program, along with the General Condition Monitoring Program, is credited for managing aging for the external surface of equipment located in a building that contains a boric acid liquid system (such as the Steam and Power Conversion system, the ESF system, and the Radwaste Ventilation system).
>
> The General Condition Monitoring Program and the Boric Acid Corrosion Program are both listed for various components in the steam and power conversion, ESF, and radwaste ventilation systems because collectively they manage the loss of material for the external surfaces of these components. The General Condition Monitoring Program provides supplemental inspections to the Boric Acid Corrosion Program for managing loss of material due to boric acid corrosion in systems that are located outside containment, such as steam and power conversion, ESF, and radwaste ventilation systems. Any instances of boric acid leakage identified during general condition monitoring activities are entered into the corrective action program and evaluated using the guidance of the Boric Acid Corrosion Program.
>
> The effectiveness questions identified are addressed by the Boric Acid Corrosion Program, not the General Condition Monitoring Program, since the Boric Acid Corrosion Program provides the evaluation and corrective actions when any evidence of boric acid leakage is identified. A more detailed answer is as follows:
>
> i) Non-insulated components are examined by inspecting the accessible external surfaces for direct and indirect evidence of leakage. For components whose external surfaces are inaccessible for direct visual examination, the surrounding areas (including equipment surfaces located underneath the components) are examined for signs of leakage and other areas are considered where leakage may be channeled.

The Boric Acid Corrosion Program recognizes that boric acid leaks can travel down sloped piped or under insulation. Evidence of leakage can also be determined for components with vertical surfaces of insulation by examining the lowest elevation where the leakage may be detectable. Horizontal surfaces of insulation can be examined at insulation joints. When there is doubt as to a leak's origin, the evidence (i.e., accumulation of boric acid crystals) needs to be preserved until an evaluation has been performed to estimate the source, pathway, target and amount that may be affected. This includes the removal of insulation to determine the leak location.

For those areas identified as infrequently accessed areas, for the purposes of detecting boric acid leakage, entry into the area is performed often enough (at least once per refueling interval) to credit the inspections in the General Condition Monitoring AMP and the Boric Acid Corrosion AMP. The one exception is the Unit 3 demineralizer cubicles area. However, for this area, a video inspection is performed at least once per ten years to verify the integrity of the equipment. Based on operating experience, there is reasonable assurance that this inspection interval will detect borated water leakage prior to the loss of intended function of the affected equipment.

ii) The Millstone Boric Acid Corrosion Program examines locations susceptible to boric acid leakage inside Containment during each refueling outage. It is not practical to perform these examinations while the reactor plant is operating.

Any boric acid leakage identified by plant personnel is either corrected prior to the end of the outage or is evaluated to ensure the intended function is maintained until a repair can be performed. Dominion is aware of the issues associated with boric acid corrosion, and the plant operating conditions that could be indicative of boric acid leakage. For potential boric acid corrosion leakage, which may develop between refueling cycles, changes in plant parameters would provide indication that a potential leak may exist. Both identified and unidentified leakage is strictly monitored and trended for changes in sump level, flow rates, and frequency of pump operation. Changes in ambient conditions inside containment also provide indication of potential boric acid leakage.

Abnormal ambient conditions inside containment are documented through the corrective action process, which may require a shutdown of the reactor plant in order to repair a leak inside containment. Plant operating experience indicates that boric acid inspections performed once per refueling cycle are adequate to maintain the intended function of the equipment in containment. Plant and industry operating experience indicates that a boric acid leak that starts during the operating cycle does not damage the equipment to the point where it cannot perform its intended function.

iii) In accordance with the Boric Acid Corrosion Program, any boric acid leakage identified by plant personnel (including boric acid crystals without material degradation) is documented through the corrective action process (10 CFR 50, Appendix B). Minor leakage may be just cleaned or, if leakage is more severe, a Boric Acid Corrosion Program assessment of the boric acid build-up is performed prior to clean-up. The leakage source, path, and target areas are located, and corrective actions are implemented as determined by the Boric Acid Corrosion Program. Corrective actions include timely repair of the leakage after detection to prevent or mitigate the extent of boric acid corrosion. Where evaluations are performed without repair or replacement, engineering analysis reasonably assures that the intended function is maintained consistent with the current licensing basis.

iv) The Boric Acid Corrosion Program provides for prompt identification of the specific cause and location of borated water leakage.

See response in item iii above.

Accessible areas are traversed on a daily basis by plant personnel who have been informed of expectations related to boric acid identification and corrective action. Personnel are expected to attempt to identify the leakage source as well as the extent of condition on secondary plant equipment. The Corrective Action Process triggers an investigation by the Boric Acid Corrosion Program. Minor boric acid may be just cleaned, more substantial leakage requires equipment to be repaired to stop the leak or an engineering evaluation be performed to ensure the intended function of the equipment is maintained until such a time that the leak can be repaired.

The staff reviewed the applicant's response and determined that the response was reasonable and acceptable because the applicant credits a combination of the general condition monitoring program and the boric acid corrosion program to detect and evaluate borated water leakage and boric acid corrosion to maintain the intended function of the auxiliary system components. For areas outside containment, general equipment (or materials) frequent inspections are performed as often as daily, which would identify any borated water leakage and any required subsequent evaluation. In response to staff's request of RAI 3.3-B-1, the applicant committed to the following clarification to the Unit 2 Appendix A "FSAR Supplement," Section A2.1.3, Boric Acid Corrosion, Program Description, and the Unit 3 Appendix A "FSAR Supplement," Section A2.1.2, Boric Acid Corrosion, Program Description. (Refer to Section 3.3A for additional details.)

3.4B.2.1.2 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and/or Stress Corrosion Cracking

In Table 3.4.1, Item 8, for loss of material due to general corrosion, crack initiation and growth due to cyclic loading and/or stress corrosion cracking (SCC) for closure bolting in high-pressure or high-temperature systems components, the applicant stated that bolting in the steam and power conversion systems were not subject to wetted conditions. Therefore, loss of material due to general corrosion is not expected. Additionally, cracking for bolting in steam and power conversion systems was not identified as an aging effect requiring management. However, SRP-LR Table 3.4-1 stipulates that the AMR evaluations consider crack initiations and growth due to cyclic loading for component's closure bolting in high-pressure or high-temperature systems and that the applicant should manage the aging effects using GALL AMP XI.M18, "Bolting Integrity."

The applicant stated in the LRA that SCC is an aging mechanism that requires the simultaneous action of a corrosive environment, a sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate the susceptibility to SCC. Further, the applicant stated that steam and power conversion systems bolting is fabricated to ASTM A194, Grade B7 standard, is not high yield strength (>150 ksi), and is not subject to an adverse environment that could result in SCC. Therefore, cracking is not an aging effect requiring management.

The staff noted that SCC could occur in corrosive environment and that the environment does not have to be in a wetted condition. The staff questioned the applicant whether good bolting practices, bolting preload considerations, and proper sealant and lubricant, as stated in NUREG-1339, are followed.

By letter dated December 3, 2004, the applicant submitted a supplement. The applicant stated that it had developed a specific bolting integrity aging management program that addresses degradation of bolting at MPS. The bolting integrity program is addressed in Section 3.0.3.2.18 of this SER.

By letter dated January 11, 2005, the applicant submitted its bolting aging management roll-up item. In its response, the applicant replaced the existing information in the "Discussion" column of LRA Table 3.4.1, Item 8 with "consistent with the NUREG-1801." The staff reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report.

The staff reviewed the applicant's response and finds this acceptable since it is consistent with the GALL Report.

3.4B.2.1.3 Loss of Material Due to General Corrosion (Carbon Steel Only), Pitting, and Crevice Corrosion, MIC, and Biofouling; Buildup of Deposit Due to Biofouling

In the discussion section of Table 3.4.1, Item 9, of the LRA, the applicant proposed to manage loss of material due to general (carbon steel), pitting, and crevice corrosion, MIC, and biofouling and buildup of deposit due to biofouling hot water heating and pre-heating component serviced by open-cycle cooling water components using MPS AMP B2.1.25, "Work Control Process." The GALL Report recommends GALL AMP XI.M20, "Open-Cycle Cooling Water System," to manage the aging effects. The applicant proposed to manage the aging effects by MPS AMP B2.1.25, "Work Control Process," for those components identified in LRA Tables 3.4.2-8 and 3.4.2-9.

The staff reviewed the service water system (open-cycle cooling) and work control process program and its evaluation of these programs is documented in Sections 3.0.3.2.15 and 3.0.3.3.4 of this SER, respectively. On the basis of its review, the staff concludes that applicant's work control process program is an acceptable alternate inspection program for this component to manage the aging effects.

3.4B.2.1.4 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion

In the discussion section of Table 3.4.1, item 10, of the LRA, the applicant stated that for components in a treated water environment other than closed-cycle cooling water, loss of material is managed by the chemistry control for secondary systems or the work control process.

The GALL Report identifies that further evaluation is required for components managed by water chemistry program in the steam and power conversion system. During the audit and review, the staff requested that the applicant provide clarification why those components that are managed by the chemistry control program do not require further evaluation.

By letter dated November 9, 2004, the applicant submitted its response. In its response, the applicant stated that GALL Report, Item VIII.E.4-a, which references GALL AMP XI.M2, “Water Chemistry,” should have been chosen for these components, along with a Note D to indicate that the component is different than the component described in the NUREG-1801. The further evaluation recommended, associated with GALL Report, Item VIII.E.4-a in LRA Table 3.4.1, Item 3.4.1-02, is addressed in LRA Section 3.4.2.2.2.

The applicant also stated, in the LRA, that the effectiveness of MPS AMP B2.1.6, “Chemistry Control for Secondary Systems Program,” is confirmed by MPS AMP B2.1.25, “Work Control Process.” The work control process program provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process program provides input to the corrective action program if and when aging effects are identified. The corrective action program evaluates the cause and extent of the condition and, if required, recommends enhancements to ensure continued effectiveness of the chemistry control for secondary systems program. The staff finds that the applicant’s response is acceptable and consistent with the GALL Report.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in the LRA Table 3.4.1 (Table 1), the applicant’s references to the GALL Report are acceptable and no further staff review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.4.2.2 of the LRA, the applicant provides further evaluation of aging management as recommended by the GALL Report for steam and power conversion systems. The applicant provided information concerning how it will manage the following aging effects:

- cumulative fatigue damage
- loss of material due to general, pitting, and crevice corrosion
- loss of material due to general, pitting, and crevice corrosion, microbiologically influenced corrosion, and biofouling
- general corrosion
- loss of material due to general, pitting, crevice, and microbiologically influenced corrosion
- quality assurance for aging management of non-safety-related components

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.4.2.2 of the Standard Review Plan for License Renewal. Details of the staff's audit and review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.4B.2.2.1 Cumulative Fatigue Damage

As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.4B.2.2.2 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion

SRP-LR Section 3.4.2.2.2 states that the management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The water chemistry program relies on monitoring and control of water chemistry based on the EPRI guidelines of TR-102134, "PWR Secondary Water Chemistry Guideline-Revision 3," for secondary water chemistry to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, "Water Chemistry," and GALL AMP XI.M32, "One Time Inspection," for management of this aging effect.

The applicant stated in the LRA that the loss of material due to general corrosion, pitting, and crevice corrosion in the steam and power conversion system components is managed by control of water chemistry through MPS AMP B2.1.6, “Chemistry Control for Secondary Systems.” The applicant also stated that in lieu of a one-time inspection, MPS AMP B2.1.25, “Work Control Process” is used to provide confirmation of the effectiveness of the chemistry control for secondary systems program. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis and provides input to the corrective action program if aging effects are identified. The corrective action program would evaluate the cause and extent of the condition and, if required, recommend enhancements to ensure continued effectiveness of the chemistry control for secondary systems program.

The staff reviewed the chemistry control for secondary systems and its evaluation is documented in Section 3.0.3.2.3 of this SER. In addition, during the audit, in response to the staff’s query regarding the one-time inspection, the applicant stated that the work control process program provides more opportunities for inspection of signs of aging than would a one-time inspection program. In addition, it provides confirmation of chemistry control effectiveness on a continuing basis, rather than at a single point in time afforded by a one-time inspection program. The applicant confirmed that indications of age-related degradation would be evaluated and the extent of the condition be determined through the corrective action system. Enhancements to water chemistry control programs and follow-up inspections would be initiated, as necessary, to provide effective management of aging effects.

The staff reviewed the information provided in the LRA and concurs that the applicant’s approach is consistent with GALL AMP XI.M32, “One-time Inspection,” which states: “An alternate acceptable program may include routine maintenance or a review of repair records to confirm that these components have been inspected for aging degradation and significant aging degradation has not occurred and thereby verify the effectiveness of the existing AMPs.” Also, the staff reviewed operating experience associated with the work control process program as it applied to the steam and power conversion system. The staff reviewed the applicant’s technical report for work control inspection opportunities, which provided the results of a plant-wide review of maintenance history for a 10-year period. The staff finds that more than 50 work control related inspection opportunities were listed against the steam and power conversion system. The staff finds this to be adequate for providing confirmation of the effectiveness of the chemistry control for secondary systems program.

3.4B.2.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

SRP-LR Section 3.4.2.2.3 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in carbon steel piping and fittings for untreated water from the backup water supply in the auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1 (Appendix A.1, of the SRP-LR).

The applicant stated, in LRA Section 3.4.2.2.3, that the backup water supply for the auxiliary feedwater system is the service water system. The backup water source is maintained isolated from the auxiliary feedwater system by removed spool pieces, which are normally maintained in storage, thus ensuring that untreated water from the service water system does not enter the auxiliary feedwater pumps suction piping. The applicant also states that the backup water supply piping and components were evaluated to be satisfactory for the effects of aging with the service water system.

During the audit and review, the staff reviewed Unit 3 piping and instrumentation diagrams related to the service water system. On the basis of its review, the staff finds that there was effective isolation to ensure that untreated water from the service water system does not enter the auxiliary feedwater pumps suction piping.

Since the untreated water environment is isolated from the auxiliary feedwater pumps suction piping, this aging effect is not applicable to auxiliary feedwater pumps suction piping. On this basis, the staff concludes that not including this aging effect is acceptable.

3.4B.2.2.4 Loss of Material Due to General Corrosion

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including closure boltings, exposed to operating temperatures less than 212 °F. The GALL Report recommends further evaluation to ensure that this aging effect is adequately managed.

The applicant stated in the LRA that general corrosion is applicable to carbon steel, low-alloy steel, and cast iron components in an air environment only when it is exposed to intermittent wetting. The applicant also stated that loss of material due to general corrosion of external surfaces is managed by MPS AMP B2.1.13, “General Condition Monitoring.”

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.4 of this SER. On the basis of its review, the staff concludes that this program is acceptable for managing loss of material since visual inspection of external surfaces is performed during various walkdowns.

3.4B.2.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

SRP-LR Section 3.4.2.2.5 addresses loss of material due to general corrosion (carbon steel only), pitting and crevice corrosion, and MIC which could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers (for steam turbine pumps) in the auxiliary feedwater system. The GALL Report recommends further evaluation to ensure that these aging effects are adequately managed.

SRP-LR Section 3.4.2.2.5 also addresses loss of material due to general corrosion, pitting and crevice corrosion, and MIC, which could occur in underground piping and fittings and emergency condensate storage tank in the auxiliary feedwater system and the underground condensate storage tank in the condensate system. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general corrosion, pitting and crevice corrosion, and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

The applicant stated, in LRA Section 3.4.2.2.5.1, that loss of material of the auxiliary feedwater pump lube oil coolers is managed by the work control process. The applicant further stated, in LRA Section 3.4.2.2.5.2, that there are no underground, carbon steel components associated with the auxiliary feedwater system, and therefore, this item is not applicable.

In LRA Table 3.4.2-5, the applicant proposed to manage loss of material due to pitting, crevice corrosion, and microbiologically influenced corrosion for the stainless steel oil coolers in auxiliary feedwater (AFW) system exposed to oil using MPS AMP B2.1.25, “Work Control Process.”

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process provides the opportunity to visually inspect the components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that using the work control process program to manage the aging effect of loss of material for the oil cooler in AFW system is adequate.

On the basis that there are no buried components in steam and power conversion systems at MPS, the staff finds that this aging effect is not applicable.

3.4B.2.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff’s evaluation of the applicant’s quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.4.2-1 through 3.4.2-11 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report or are not addressed in the GALL Report. The staff also reviewed additional systems and components, provided in applicant’s letter dated January 11, 2005.

In Tables 3.4.2-1 through 3.4.2-11, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect will be managed.

Staff Evaluation. For component type, material and environment combination that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff evaluation is discussed below.

3.4B.2.3.1 Main Steam - Aging Management Evaluation - Table 3.4.2-1

The staff reviewed Table 3.4.2-1 of the LRA, which summarized the results of AMR evaluations for the main steam system component groups.

In LRA Table 3.4.2-1, the applicant identified no aging effects for the following carbon steel, and low alloy steel main steam component types - pipe, steam traps, valves, and valves (atmospheric dumps and main steam safety/relief) - exposed externally to air.

During the audit and review, the staff requested that the applicant provide clarification as to why there are no aging effects for these components. The applicant stated that the steam and power conversion systems components are normally operated at high temperatures (> 212 °F) and the external surface of the component was determined to be dry. The applicant also stated that these components are located inside buildings and because of the high operating temperature, would not be subject to condensation. These components were determined not to be susceptible to loss of material due to corrosion based on the dry environment, as described in LRA Appendix C, Section C3.7.15.

The staff expressed concern regarding possible long-term shutdown such as the plant shutdown in the 1990s. The applicant stated that the only potential source of wetting of the external surfaces for these components, in a sheltered environment, is condensation. However, intermittent wetting conditions would not be expected during out-of-service periods for these components because for condensation to occur, the surface temperature of the components would have to decrease below the dew point of the ambient environment. These normally high temperature components are located in buildings with warm to hot temperatures and they are insulated. Therefore, conditions for condensation are not expected even when the components are out of service for long periods of time.

Since the external surface temperature for these main steam system components is high enough to preclude condensation and these components are not exposed to the intermittent wetting, the staff finds there are no applicable aging effects for the above-mentioned components.

In LRA Table 3.4.2-1, the applicant identified no aging effects for the following stainless steel and nickel-based alloy main steam component types exposed externally to air: expansion joints, flexible hoses, flow elements, tubing, and valves.

On the basis of current industry research and operating experience, stainless steel/nickel-based alloy exposed externally to air is not susceptible to significant general corrosion that would affect the intended function of components. Therefore, the staff finds that there are no applicable aging effects for stainless steel components exposed externally to air.

In LRA Table 3.4.2-1, the applicant proposed to manage loss of material and cracking for the following stainless steel and nickel-based alloy main steam component types - expansion joints, flexible hoses, flow elements, and tubing - exposed internally to steam using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The staff reviewed the chemistry control for secondary systems program and its evaluation of this program is documented in Section 3.0.3.2.2 of this SER. The effectiveness of the chemistry control program is further provided by MPS AMP B2.1.25, "Work Control Process" and is documented in Section 3.4.2.2.2 of this SER.

On the basis of its review and its determination that the effects of pitting and crevice corrosion on stainless steel and nickel-based alloys are not significant in treated water or steam, the staff finds that management of loss of material for stainless steel/nickel-based alloy components using the chemistry control for secondary systems program is adequate.

The applicant stated in the LRA that stress corrosion cracking is an aging mechanism that requires the simultaneous action of a corrosion environment, a sustained stress, and a susceptible material. The applicant also stated that elimination of any one of these elements will eliminate the susceptibility to stress corrosion cracking. The applicant credits MPS AMP B2.1.6, "Chemistry Control for Secondary Systems," to manage this aging mechanism since it removed one of the three required actions (corrosion environment).

The chemistry control program for secondary systems maintains a controlled environment with low contaminant concentration and the applicant's operating experience has shown this program to be effective for the management of cracking due to stress corrosion cracking, the staff therefore finds that the applicant has demonstrated that the effects of aging for stress corrosion cracking for stainless steel and nickel-based components using chemistry control for secondary systems will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.3.2 Feedwater - Aging Management Evaluation - Table 3.4.2-2

The staff reviewed LRA Table 3.4.2-2, which summarized the results of AMR evaluations for the feedwater system component groups.

In LRA Table 3.4.2-2, the applicant proposed to manage cracking for the following stainless steel feedwater steam system component types - flow elements, tubing, and valves - exposed internally to steam using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for feedwater steam components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of cracking for stainless steel components using the chemistry control for secondary systems program is adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

The applicant identified no aging effects for the following stainless steel, carbon steel, and low-alloy steel feedwater steam system component types - flow elements, pipe, tubing, and valves - exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel, carbon steel and low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

3.4B.2.3.3 Condensate Make-Up and Draw-Off - Aging Management Evaluation - Table 3.4.2-3

The staff reviewed LRA Table 3.4.2-3, which summarized the results of AMR evaluations for the condensate make-up and draw-off system component groups.

In LRA Table 3.4.2-3, the applicant identified no aging effects for the following stainless steel condensate make-up and draw-off system component types exposed externally to air: pipe, tubing, and valves.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-3, the applicant identified no aging effects for the stainless steel condensate make-up and draw-off system rupture disk, and aluminum condensate storage tank exposed internally to gas environment.

On the basis of current industry research and operating experience, an internal environment of gas (which is similar to air) on metal will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concludes that there are no applicable aging effects for metal in a gas environment.

In LRA Table 3.4.2-3, the applicant proposed to manage loss of material for the stainless steel pipe exposed externally to damp soil environment using MPS AMP B2.1.4, "Buried Pipe Inspection Program."

The staff reviewed the buried pipe inspection program and its evaluation is documented in Section 3.0.3.2.1 of this SER. On the basis of its review, the staff finds that using the buried pipe inspection program to manage the aging effect of loss of material for the buried pipe component is adequate.

The LRA Table 3.4.2-3 credits the AMP B2.124 "Tank Inspection Program" for managing the loss of material of the aluminum condensate storage tank in a damp soil environment. In RAI 3.4-2, the staff requested the applicant to provide the following additional information regarding the aging management of this tank: (a) the alloy content of the aluminum and the welded joints or connections; (b) the type of coatings and/or linings, if any; (c) the support configuration of the tank in the moist soil environment; (d) the NDE methods which are employed to determine degradation of the tank walls and bottom; (e) the frequency of the wall thickness measurements, their locations and acceptance criteria; and (f) the operating history of the tank relating to degradation and remedial actions taken in the past.

In its response dated November 9, 2004, the applicant stated:

(a) The aging management review for the condensate storage tank did not credit any specific alloy content in the determination of applicable aging mechanisms/effects for the aluminum tank or welds.

(b) The condensate storage tank is not coated or lined. Additionally, as stated in LRA Appendix C, Section C2.4, coatings and linings were not credited in the determination of applicable aging effects for in-scope components, including tanks.

(c) The support configuration for the condensate storage tank consists of a reinforced concrete foundation with an oiled sand cushion as described in LRA Section 2.4.2.32. The oiled sand tank bottom supporting material was conservatively assumed to be equivalent to moist soil for the purposes of the aging management review.

(d) The aging management review for the condensate storage tank concluded that the tank bottom could be subject to loss of material. As discussed in LRA Appendix B, Section B2.1.24 "Tank Inspection Program," thickness measurement of the tank bottom will be performed using volumetric non-destructive examination methods.

(e) Per LRA Appendix A, Table A6.0-1, commitment 24, a baseline inspection of the condensate storage tank bottom will be performed prior to the period of extended operation. After that, as a minimum (depending upon baseline inspection results), inspections will occur every ten years. As noted in (d) above, the tank bottom thickness will be measured using volumetric non-destructive examination methods prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.

(f) The operating history associated with the condensate storage tank is described in LRA Appendix B, Section B2.1.24. During a past inspection of the tank, water was found to be slowly leaking from the tank. Previous inspections of the tank had detected only occasional wetness. Internal operating experience had identified that the bottom of a similarly designed tank (the condensate surge tank) had already been replaced. The condensate surge tank did not have a barrier installed between the aluminum tank bottom and the sand that forms part of the base mat. An alkaline solution resulting from groundwater intrusion to the concrete foundation ring caused pitting of the aluminum and eventual through-wall leakage. An engineering evaluation concluded that the condensate storage tank and condensate surge tank were both built at the same time using a similar design. As a result of the investigation and previous operating experience, a design change was implemented to replace the condensate storage tank bottom.

> The new tank bottom was essentially a one for one replacement. In addition, the existing oil and sand mixture under the tank bottom was replaced with washed, clean, neutral, dry, low chloride and compacted sand, and asphalt impregnated fiber board was installed as a barrier between the aluminum tank and concrete foundation ring.

The staff finds the applicant's response reasonable and acceptable because the applicant is employing appropriate NDE methods for determining tank bottom degradation as well as remedial action to prevent degradation in the future.

3.4B.2.3.4 Steam Generator Blowdown - Aging Management Evaluation - Table 3.4.2-4 and Table 3.4.2-4a

The staff reviewed LRA Table 3.4.2-4 and Table 3.4.2-4a of the applicant's letter dated January 11, 2005, which summarized the results of AMR evaluations in the SRP-LR for the steam generator blowdown system component groups.

In LRA Table 3.4.2-4, the applicant identified no aging effects for the following stainless steel, carbon steel and low-alloy steel steam generator blowdown system component types exposed externally to air: flow elements, pipe, and tubing.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel, carbon steel and low-alloy steel components in external air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-4, the applicant proposed to manage cracking for the following stainless steel steam generator blowdown system component types - flow elements, and tubing - exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems."

The material, environment, aging effects, and aging management program (MEAP) for steam generator blowdown components is the same as that for the main steam components. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using chemistry control for secondary systems program to be adequate. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-4 and Table 3.4.2-4a of the applicant's letter dated January 11, 2005, the applicant identified no aging effects for the following stainless steel, carbon steel and low-alloy steel steam generator blowdown system component types - flow elements, pipe, tubing, and steam generator blowdown tank - exposed externally to air. On the basis that these components have the same MEAP combination as previously discussed, the staff finds that there are no aging effects for these stainless steel, carbon steel and low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

3.4B.2.3.5 Auxiliary Feedwater - Aging Management Evaluation - Table 3.4.2-5 and Table 3.4.2-5a

The staff reviewed LRA Table 3.4.2-5 and Table 3.4.2-5a of the applicant's letter dated January 11, 2005, which summarizes the results of AMR evaluations for the auxiliary feedwater system component groups.

In LRA Table 3.4.2-5, the applicant identified no aging effects for the following stainless steel auxiliary feedwater system component types exposed externally to air: AFW pump oil coolers (channel heads), AFW pump oil coolers (shell), cavitating venturies, flow elements, level indicators, pipe, restricting orifices, tubing, valves and carbon steel turbine casings.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-5, the applicant has identified no aging effects for copper alloy spool pieces exposed internally and externally to air.

The applicant stated, in LRA Section 3.4.2.2.3, the removable spool pieces are normally maintained in storage. On the basis of current industry research and operating experience, an internal storage environment of air on copper alloys will not result in aging that will be of concern during the period of extended operation. Therefore, the staff concludes that there are no applicable aging effects for copper alloy spool pieces in an air environment.

In LRA Table 3.4.2-5, the applicant proposed to manage loss of material for the stainless steel demineralized water storage tank exposed internally to a treated water and air environment and carbon steel turbine casings exposed internally to treated water using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems" and MPS AMP B2.1.25, "Work Control Process."

The GALL Report recommends GALL AMP XI.M2, "Water Chemistry," to be augmented by verifying the effectiveness of water chemistry control by a supplementary program. GALL AMP XI.M32, "One-Time Inspection," is an acceptable verification program.

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The effectiveness of the chemistry control program is provided further by MPS AMP B2.1.25, "Work Control Process," and is documented in Section 3.0.3.2.3 of this SER. The work control process provides the opportunity to visually inspect the surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process also provides input to the corrective action program if aging effects are identified. On the basis on its review, the staff finds management of loss of material for these components using the chemistry control for secondary systems and work control process program to be adequate.

In LRA Table 3.4.2-5, the applicant proposed to manage loss of material for the stainless steel pipe exposed externally to damp soil environment using MPS AMP B2.1.4, "Buried Pipe Inspection Program."

The staff reviewed the buried pipe inspection program and its evaluation is documented in Section 3.0.3.2.1 of this SER. On the basis of its review, the staff finds the buried pipe inspection program acceptable for managing the aging effect of loss of material for the buried pipe component.

In LRA Table 3.4.2-5, the applicant proposed to manage loss of material for the stainless steel demineralized water storage tank exposed externally to atmosphere/weather environment using MPS AMP B2.1.24, "Tank Inspection Program."

The staff reviewed the tank inspection program and its evaluation is documented in Section 3.0.3.2.17 of this SER. On the basis of its review, the staff finds management of loss of material for this component using the tank inspection program to be adequate.

In LRA Table 3.4.2-5, the applicant proposed to manage cracking for the following stainless steel auxiliary feedwater system component types, AFW pump oil coolers (tube sheets) and AFW pump oil coolers (tube), exposed externally to oil environment and AFW pump oil coolers (shell) exposed internally to oil environment using MPS AMP B2.1.25, "Work Control Process."

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process provides the opportunity to visually inspect the surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds the work control process program acceptable for managing the aging effect of cracking for stainless steel AFW pump oil cooler tubesheets, tubes and shell.

3.4B.2.3.6 Auxiliary Steam - Aging Management Evaluation - Table 3.4.2-6

The staff reviewed LRA Table 3.4.2-6, which summarized the results of AMR evaluations for the auxiliary steam system component groups.

In LRA Table 3.4.2-6, the applicant identified no aging effects for the stainless steel/carbon steel/low-alloy steel pipe, tubing, and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless components exposed externally to air. The staff's evaluation is documented in Section 3.4.2.3.1 of this SER.

In LRA Table 3.4.2-6, the applicant proposed to manage cracking for stainless steel tubing exposed internally to a treated water and steam environment using MPS AMP B2.1.6, "Chemistry Control for Secondary Systems Program."

MEAP for auxiliary steam is the same as that for the main steam components as discussed in Section 3.4B.2.3.1. Since both have the same MEAP combination, the staff finds that management of loss of material and cracking for stainless steel components using the chemistry control for secondary systems program to be adequate. The staff reviewed the chemistry control for secondary systems program and its evaluation is documented in Section 3.0.3.2.3 of this SER.

3.4B.2.3.7 Auxiliary Boiler Condensate and Feedwater - Aging Management Evaluation - Table 3.4.2-7 and Table 3.4.2-7a

The staff reviewed LRA Table 3.4.2-7 and Table 3.4.2-7a of the applicant's supplement dated January 11, 2005, which summarizes the results of AMR evaluations for the auxiliary boiler condensate and feedwater system component groups.

In Table 3.4.2-7 of the LRA and Table 3.4.2-7a of the applicant's letter dated January 11, 2005, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel auxiliary boiler condensate and feedwater system component types exposed externally to air: auxiliary condensate flash tank, restricting orifices, sample coolers, steam traps, tubing, flow elements, and radiation detectors.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4B.2.3.1 of this SER.

3.4B.2.3.8 Hot Water Heating - Aging Management Evaluation - Table 3.4.2-8

The staff reviewed LRA Table 3.4.2-8, which summarizes the results of AMR evaluations for the hot water heating system component groups.

In LRA Table 3.4.2-8, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel hot water heating system component types exposed externally to air: flex connections, flow elements, pipe, and tubing.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4B.2.3.1 of this SER.

In LRA Table 3.4.2-8, the applicant has identified no aging effects for the copper alloy unit heaters exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these copper alloy components in external air. Its evaluation is documented in Section 3.4.2.3.5 of this SER.

3.4B.2.3.9 Hot Water Pre-Heating - Aging Management Evaluation - Table 3.4.2-9

Summary of Technical Information in the Application. The staff reviewed LRA Table 3.4.2-9, which summarized the results of AMR evaluations for the hot water pre-heating system component groups.

In LRA Table 3.4.2-9, the applicant identified no aging effects for the following stainless steel/carbon steel/low-alloy steel hot water pre-heating system component types exposed externally to air: flow elements, pipe, tubing, and valves.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4B.2.3.1 of this SER.

3.4B.2.3.10 Steam Generator Chemical Addition - Aging Management Evaluation - Table 3.4.2-10

The staff reviewed LRA Table 3.4.2-10, which summarized the results of AMR evaluations for the steam generator chemical addition system component groups.

In the LRA Table 3.4.2-10, the applicant identified no aging effects for stainless steel pipe and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel/carbon steel/low-alloy steel components exposed externally to air. The staff's evaluation is documented in Section 3.4B.2.3.1 of this SER.

In LRA Table 3.4.2-10, the applicant proposed to manage loss of material for the stainless steel pipe exposed externally to an atmosphere/weather environment using MPS AMP B2.1.13, "General Condition Monitoring Program."

The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that this program is acceptable for managing loss of material since visual inspections of external surfaces are performed during various walkdowns.

In LRA Table 3.4.2-10, the applicant proposed to manage cracking for the stainless steel piping and valves exposed internally to a treated water environment using MPS AMP B2.1.25, "Work Control Process."

The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The work control process provides the opportunity to visually inspect the internal surfaces of components during preventive and corrective maintenance activities on an ongoing basis. The work control process provides input to the corrective action program if aging effects are identified. On the basis of its review, the staff finds that using the work control process program to manage the aging effect of loss of material for these components is adequate.

3.4B.2.3.11 Turbine Plant Miscellaneous Drains - Aging Management Evaluation - Table 3.4.2-11

The staff reviewed LRA Table 3.4.2-11, which summarized the results of AMR evaluations for the turbine plant miscellaneous drains system component groups.

In LRA Table 3.4.2-11, the applicant identified no aging effects for carbon steel and low-alloy steel pipe, steam traps, and valves exposed externally to air.

On the basis that these components have the same previously discussed MEAP combination, the staff finds that there are no aging effects for these stainless steel components exposed externally to air. The staff's evaluation is documented in Section 3.4B.2.3.1 of this SER.

The staff reviewed all other AMRs assigned in Tables 3.4.2-1 through 3.4.2-11 of the LRA and LRA supplements. The staff finds them to be acceptable.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the steam and power conversion system components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the steam and power conversion system, as required by 10 CFR 54.21(d).

3.5 Aging Management of Containment, Structures and Component Supports

3.5A Unit 2 Aging Management of Containment, Structures and Component Supports

This section of the SER documents the staff's review of the applicant's AMR results for the containment, structures and component supports components and component groups associated with the following structures:

- containment
- structures and structural components:
    - Unit 2 containment enclosure building
    - Unit 2 auxiliary building
    - Unit 2 warehouse building
    - Unit 2 turbine building
    - Unit 1 turbine building
    - Unit 1 control room and radwaste treatment building
    - Unit 2 fire pump house
    - Unit 3 fire pump house
    - SBO diesel generator enclosure and fuel oil tank vault
    - Unit 2 condensate polishing facility and warehouse no. 5
    - security diesel generator enclosure
    - stack monitoring equipment building
    - millstone stack
    - switchyard control house

    - retaining wall
    - 345kV switchyard
    - Unit 2 intake structure
    - sea walls
    - Unit 2 discharge tunnel and discharge structure
    - Unit 2 bypass line
    - tank foundations
    - yard structures
- NSSS equipment supports
- general structural supports
- miscellaneous structural commodities
- load handling cranes and devices

3.5A.1 Summary of Technical Information in the Application

In LRA Section 3.5, the applicant provided AMR results for containment, structures and component supports components and component groups. In LRA Table 3.5.1, "Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the containment, structures and component supports components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.5A.2 Staff Evaluation

The staff reviewed LRA Section 3.5 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the containment, structures and components supports system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.5A.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.5.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear

Power Plants," dated July 2001. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.5A.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.5A.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.5A.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the containment, structures and components supports system components.

Table 3.5A-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.5 that are addressed in the GALL Report.

Table 3.5A-1 Staff Evaluation for Containment, Structures and Component Supports in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Common Components of All Types of PWR and BWR Containment				
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1-01)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6A.
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1-02)	Cracking due to cyclic loading; crack initiation and growth due to SCC	Containment inservice inspection (ISI) and Containment leak rate test		Not Consistent with GALL (See Section 3.5A.2.2.1)
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1-03)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1-04)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Personnel airlock and equipment hatch (Item Number 3.5.1-05)	Loss of leak tightness in closed position due to mechanical wear of locks, hinges, and closure mechanisms	Containment leak rate test and Plant Technical Specifications	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Seal, gaskets, and moisture barriers (Item Number 3.5.1-06)	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16); Work control process (B2.1.25)	Not Consistent with GALL (See Section 3.5A.2.2.1)
PWR Concrete (Reinforced and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment				
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-07)	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.1)
Concrete elements: foundation (Item Number 3.5.1-08)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring		Not Consistent with GALL (See Section 3.5A.2.2.1)
Concrete elements: foundation (Item Number 3.5.1-09)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring		Not Consistent with GALL (See Section 3.5A.2.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-10)	Reduction of strength and modulus due to elevated temperature	Plant-specific		Not Applicable (See Section 3.5A.2.2.1)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1-11)	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.5

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Steel element: liner plate and containment shell (Item Number 3.5.1-12)	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.1)
Steel elements: protected by coating (Item Number 3.5.1-14)	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	Inservice inspection program: containment inspections (B2.1.16)	Not Consistent with GALL (See Section 3.5A.2.2.1)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1-15)	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-16)	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Class I Structures				
All Groups except Group 6: accessible interior/exterior concrete steel components (Item Number 3.5.1-20)	All types of aging effects	Structures Monitoring	Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Section 3.5A.2.2.2)
Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation (Item Number 3.5.1-21)	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant-specific	Structures monitoring program (B2.1.23)	Consistent with GALL, which recommends further evaluation (See Section 3.5A.2.2.2)
Group 6: all accessible / inaccessible concrete, steel, and earthen components (Item Number 3.5.1-22)	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of water-control structures or FERC/US Army Corp of Engineers dam inspection and maintenance	Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Section 3.5A.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Group 5: liners (Item Number 3.5.1-23)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Water chemistry and monitoring spent fuel pool water level	Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Groups 1-3, 5, 6: all masonry block walls (Item Number 3.5.1-24)	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall	Structures monitoring program (B2.1.23)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Groups 1-3, 5, 7-9: foundation (Item Number 3.5.1-25)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring		Not Consistent with GALL (See Section 3.5A.2.2.1)
Groups 1-3, 5-9: foundation (Item Number 3.5.1-26)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring		Not Consistent with GALL (See Section 3.5A.2.2.1)
Groups 1-5: concrete (Item Number 3.5.1-27)	Reduction of strength and modulus due to elevated temperature	Plant-specific		Not Applicable (See Section 3.5A.2.2.1)
Component Supports				
Groups 7, 8: liners (Item Number 3.5.1-28)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Plant-specific		Not Consistent with GALL (See Section 3.5A.2.2.2)
All Groups support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc. (Item Number 3.5.1-29)	Aging of component supports	Structures Monitoring	Structures monitoring program (B2.1.23); General condition monitoring (B2.1.13); Battery rack inspections (B2.1.1); Infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Section 3.5A.2.2.3)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts and welds (Item Number 3.5.1-30)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3A, Metal Fatigue

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
All Groups: support members: anchor bolts and welds (Item Number 3.5.1-31)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric Acid Corrosion (B2.1.3); General Condition Monitoring (B2.1.13)	Not Consistent with GALL (See Section 3.5A.2.3.25)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolaters (Item Number 3.5.1-32)	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	Inservice inspection program: systems, components and supports (B2.1.18); Structures monitoring program (B2.1.23); General condition monitoring (B2.1.13)	Consistent with GALL, which recommends no further evaluation (See Section 3.5A.2.1)
Group B1.1: high strength low-alloy bolts (Item Number 3.5.1-33)	Crack initiation and growth due to SCC	Bolting integrity		Not Consistent with GALL (See Section 3.5A.2.3.24)

The staff's review of the MPS containment, structures and component supports and associated components followed one of several approaches. One approach, documented in Section 3.5A.2.1, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.5A.2.2, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.5A.2.3, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the containment, structures and component supports components is documented in Section 3.0.3 of this SER.

3.5A.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Sections 3.5.2.1.1 through 3.5.2.1.27 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the containment, structures and component supports components:

- boric acid corrosion program
- chemistry control for primary systems program
- general condition monitoring program
- inservice inspection program: containment inspections
- structures monitoring program
- work control process program

- Boraflex monitoring program
- infrequently accessed areas inspection program
- inservice inspection program: systems, components and supports
- battery rack inspections
- fire protection program
- inspection activities: load handling cranes and devices

Staff Evaluation. In Tables 3.5.2-1 through 3.5.2-27 of the LRA, the applicant provided a summary of AMRs for the containment and containment internals, auxiliary building, turbine building and intake structure, yard structures, and structural commodities, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.5A.2.1.1 Aging of Component Supports

In LRA Table 3.5.2-25 (page 3-535), the applicant stated that the loss of material of carbon steel and low-alloy steel for structural support components in an air or atmosphere/weather environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," MPS AMP B2.1.23, "Structures Monitoring Program," and MPS AMP B2.1.13, "General Condition Monitoring," and GALL that Item III.B2.1-a is matched. During the audit and review, the staff asked the applicant to explain why Note E was used for the infrequently accessed areas inspection program, Note A used for the structures monitoring program, and Note C used for the general condition monitoring program. The applicant stated that Note C was incorrectly applied to the general condition monitoring line items. Note A should have been applied since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, "Structures Monitoring Program." MPS AMP B2.1.23 is used to manage aging of non-ASME class, large equipment supports; and MPS AMP B2.1.13 is used to manage aging of other non-ASME class supports.

In an LRA supplement dated July 7, 2004, the applicant stated that Note C should be Note A for the general condition monitoring line items in LRA Table 3.5.2-25 (pages 3-532 through 3-538) since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, "Structures Monitoring Program."

On the basis of its review of the applicant's response, the staff finds the response to be acceptable.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.5.1 (Table 1), the applicant's references to the GALL Report are acceptable, that the line items are consistent with GALL, and no further staff review is required.

Staff RAIs Pertaining to Recent Operating Experience and Emerging Issues. Because the GALL Report and SRP-LR were issued in July 2001, these documents do not reflect the most current recommendations for managing certain aging effects that have been the subject of recent operating experience or the topic of an emerging issue. As a result, the staff issued RAIs to determine how the applicant proposed to address these items for license renewal. The applicant's responses to these RAIs, and the staff's evaluations of the responses, are documented as follows.

In RAI 3.5-5, the staff requested information about the members of structures other than containments that uses the structures monitoring program as an AMP. Under column "Structural Member" in Table 3.5.2-x, structures and component supports, structures monitoring program is listed as an AMP for many structural members, such as doors, sliding bearings, metal siding sealants, roofing, siding, scuppers, miscellaneous steel, expansion joint/seismic gap material, and flood door/gate gasket. Item 18 in Table A6.0-1, License Renewal Commitments, states,"The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures." The staff assumes that the words "in-scope structures" include all structural members listed in Table 3.5.2-x that use the structures monitoring program as an AMP. Please confirm whether the staff's assumption is correct or not.

By letter dated November 9, 2004, the applicant stated that this assumption is correct. Any in scope structural members that are not currently in the structures monitoring program, such as those listed above, but are required to be inspected, will be added to the program prior to the period of extended operation.

The staff finds the applicant's response acceptable.

In RAI 3.5-6, the staff requested information about the work control process AMP. The work control process is listed as an AMP for many structural members, such as the rubber seal of the spent fuel pool gate, the carbon steel sump liner, and the neoprene gaskets in junction, terminal, and pull boxes. The staff did not find that these structural members were included in the scope of program of the b2.1.25 work control process or that Table A6.0-1 lists these structural members in the work control process as a license renewal commitment. The applicant was asked to explain how the work control process includes and tracks the structural members listed in Table 3.5.2-x that use the work control process as an AMP.

The applicant stated that the work control process inspects materials and environments in lieu of specific component types. Inspections are performed as part of preventive maintenance, corrective maintenance, predictive analysis, periodic surveillance, etc. A review of the work control process inspection opportunities for each material and environment group that is in scope of License Renewal was performed for Millstone Units 2 and 3. It demonstrated adequate inspection opportunities for the vast majority of material and environment combinations. A review of the work control process inspection opportunities for each material and environment group supplemental to the initial review conducted during the development of the LRA will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the work control process. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 30 (Unit 2) and 31 (Unit 3). These inspections will address the above item if no opportunity for inspection has been provided, prior to the period of extended operation. Unacceptable inspection results will be identified in the corrective action process. Corrective actions will consider the extent of condition of all component types included in that material and environment combination.

The staff finds the applicant’s response acceptable. The staff evaluation of the work control process AMP is documented in Section 3.0.3.3.4.

In RAI 3.5-11, the staff requested the applicant to discuss whether Millstone Units 2 or 3 had piping and component supports that are anchored to concrete by using bolts with yield strength greater than 150 ksi? If yes, identify the AMP for those bolts and provide basis for the selection of the AMP if Bolting Integrity program is not selected.

By letter dated November 9, 2004, the applicant stated that no piping or component supports in Millstone Unit 2 or 3 have been identified as being anchored to concrete using anchor bolts with specified yield strengths greater than 150 ksi.

The staff finds the applicant’s response acceptable.

As a result of issues raised during the scoping and screening methodology audit (discussed in Section 2.1.3.1), the staff requested additional information concerning newly in scope structures. The following is a discussion of the applicant’s responses and the staff evaluations.

In response to RAI 2.4-7 (Unit 2) and RAI 2.4-11 (Unit 3), the applicant stated that the post-tensioned anchorage system for the sea walls is within the scope of license renewal and the AMR result concluded that there are no aging effects requiring management. The staff reviewed the anchorage detail, as shown in FSAR Figure 2.5-15, and found that there are sufficient concrete surrounding the post-tensioned anchorage system to protect it from the environment and, therefore, concurs with the applicant’s conclusion.

In response to RAI 2.4-1, the applicant added the condensate polishing service water strainer house to the scope of license renewal and stated that the aging effects are loss of material, cracking, and change of material properties for concrete and they will be monitored by the structures monitoring program AMP. The staff concurs with the applicant’s proposal.

In response to RAI 2.4-1, the applicant added Unit 2 hydrogen cylinder storage area (building 226) to the scope of license renewal. The structural members of the building consists of reinforced concrete in soil and atmosphere/weather environments and masonry block walls in an atmosphere/weather environment. The applicant stated that the aging effects are loss of material, cracking, and change of material properties for concrete and cracking for masonry block walls, and they will be monitored by the structures monitoring program AMP. The staff concurs with the applicant’s proposal.

In response to RAI 2.4-2, the applicant added Unit 2 sodium hypochlorite building to the scope of license renewal. The structure consists of structural reinforced concrete in soil, air, and atmosphere/weather environments and structural steel members in air. The applicant stated that the aging effects are loss of material, cracking, and change of material properties for concrete and loss of material for structural steel, and they will be monitored by the structures monitoring program AMP which is described in LRA Section B2.1.23. The staff concurs with the applicant’s proposal.

In response to RAI 2.4-3, the applicant added thermal insulation around high temperature piping containment penetrations to the scope of license renewal. The applicant's AMR result concluded that there are no aging effects for the fiberglass, asbestos, and calcium silicate piping penetration thermal insulation. However, the applicant stated that the localized concrete temperature in the vicinity of high energy piping containment penetrations is maintained below the threshold value by the containment penetration cooling system, which consists of a ventilation system in Unit 2 (the containment penetration cooling system described in LRA Section 2.3.3.18) and a water cooling system in Unit 3 (as part of the reactor plant component cooling system described in LRA Section 2.3.3.6). Since the concrete temperature around the containment penetration is properly maintained, the staff considers the applicant's proposal acceptable.

In response to RAI 2.4-5, the applicant added the sealant and the penetration seals component types to the scope of license renewal, and stated that they will be monitored by the containment inspection AMP as modified by the response to RAI 3.5-1 provided in Dominion letter dated November 9, 2004. The staff accepts the AMP as discussed in Section 3.5A.2.3.1 and 3.5B.2.3.1 of this SER.

The staff accepts the applicant's clarification.

On the basis of its audit and review, the staff determined that, for AMRs not requiring further evaluation, as identified in LRA Table 3.5.1 (Table 1), the applicant's references to the GALL Report are acceptable, the line items are consistent with GALL, and no further staff review is required. On the basis of its audit and review, the staff concludes that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.5.2.2 of the LRA, the applicant provides further evaluation of aging management as recommended by the GALL Report for containment, structures and component supports. Specifically, the applicant provided information concerning how it will manage the following aging effects:

- aging of inaccessible concrete areas

- cracking, distortion, and increase in component stress level due to settlement; reduction of foundation strength due to erosion of porous concrete subfoundations, if not covered by structures monitoring program
- reduction of strength and modulus of concrete structures due to elevated temperature
- loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate
- loss of prestress due to relaxation, shrinkage, creep, and elevated temperature
- cumulative fatigue damage
- cracking due to cyclic loading and SCC
- aging of structures not covered by structures monitoring program
- aging management of inaccessible areas
- aging of supports not covered by structures monitoring program
- cumulative fatigue damage due to cyclic loading

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.5.2.2 of the Standard Review Plan for License Renewal. Details of the staff's audit and review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections of this SER.

3.5A.2.2.1 PWR Containments

The staff reviewed LRA Section 3.5.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

Aging of Inaccessible Concrete Areas. In LRA Section 3.5.2.2.1.1, the applicant addressed aging of inaccessible concrete areas of the containment.

For inaccessible portions of the containment structure, 10 CFR 50.55a(b)(2)(ix) requires that the applicant evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

The AMP recommended by the GALL Report for managing the aging of the accessible portions of the containment structures is GALL AMP XI.S2, "ASME Section XI, Subsection IWL." The applicant addressed this with MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections." The staff reviewed the inservice inspection program: containment inspections program and its evaluation is documented in Section 3.0.3.2.11 of this SER. ASME Subsection IWL exempts from examination those portions of the concrete containment that are inaccessible (e.g., foundation, below-grade exterior walls, or concrete covered by liner).

The applicant also used MPS AMP B2.1.23, “Structures Monitoring Program,” to monitor accessible areas for evidence of aging effects that may be applicable to containment structures. This program, which is consistent with GALL AMP XI.S6, “Structures Monitoring Program,” with enhancements, was reviewed by the staff and its evaluation is documented Section 3.0.3.2.16 of this SER. The applicant also credited the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

In the GALL Report, Volume 2, Chapter II, Table A1 (as modified by ISG-3), further evaluation is recommended to manage the aging effects for containment concrete components located in inaccessible areas if the aging mechanisms of (1) freeze-thaw, (2) leaching of calcium hydroxide, (3) aggressive chemical attack, (4) reaction with aggregates, or (5) corrosion of embedded steel are significant. Possible aging effects for containment concrete structural components due to these five aging mechanisms are cracking, change in material properties, and loss of material.

(1) Freeze-thaw - SRP-LR Section 3.5.2.2.1.1 does not address freeze-thaw as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3, “Chapters II and III of GALL Report on Aging Management of Concrete Elements,” dated November 21, 2003, clarified the staff’s position that further evaluation is appropriate if the applicant’s facility is subject to moderate to severe weather conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

MPS is located in a region considered to be subject to severe weather conditions. In the LRA, the applicant stated that Unit 2 concrete structures are designed in accordance with ACI specification 318-63, “Building Code Requirements for Reinforced Concrete,” which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

- high cement content
- low water-to-cement ratio
- proper curing
- adequate air entrainment

In the LRA, the applicant stated that Unit 2 concrete also meets requirements of the guideline ACI 201.2R-77, “Guide to Durable Concrete.” ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

During the audit and review, the staff interviewed members of the applicant’s technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed, either through the inservice inspection - IWL program or the structures monitoring program.

On the basis of its review, the staff finds that loss of material and cracking due to freeze-thaw will be adequately managed by the containment inservice inspection program because: (1) concrete that satisfies the requirements of ACI 318-63 will meet the recommendations of ISG-3, (2) an audit of operating experience evaluated under the inservice inspection program: containment inspections and structures monitoring programs, and (3) the containment structure is protected from the elements by an enclosed structure.

(2) Leaching of calcium hydroxide - SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report, as updated by ISG-3, recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria cannot be satisfied.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the LRA, the applicant stated that the Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the requirements of guideline ACI 201.2R-77.

The staff finds that because ACI 318-63 and ACI 201.2R-77 provide assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at Unit 2, and therefore concludes that the inservice inspection program: containment inspections program will be sufficient to manage increases in porosity and permeability from this aging mechanism. A plant-specific aging management program is not required to address this aging effect.

(3) Aggressive chemical attack - SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the staff noted that the applicant uses the structures monitoring program to examine below-grade concrete when it is exposed by excavation.

On the basis of the information provided in the LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the staff finds that increases in porosity and permeability, loss of material (spalling, scaling), and cracking due to aggressive chemical attack are not significant for concrete in inaccessible areas of the Unit 2 containment. The applicant uses MPS AMP B2.1.23, “Structures Monitoring Program,” to test the groundwater on a periodic basis, considering seasonal variations, to ensure the aging mechanism of aggressive chemical attack does not become significant in the future and also to examine below-grade concrete when it is exposed by excavation. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff finds that the structures monitoring program is an appropriate program for examination of below-grade concrete when it becomes accessible.

(4) Reaction with aggregates - SRP-LR Section 3.5.2.2.1.1 does not address reaction with aggregates as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3 clarified the staff's position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the LRA, the applicant stated that Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the recommendations of guideline ACI 201.2R-77. The ACI standard specifies the testing of aggregates at the time of construction.

Through interviews with the applicant's technical staff, the staff confirmed that the results of those tests show that the aggregates used for the Unit 2 concrete containment at MPS are not reactive. The staff finds that this aging effect does not require management at MPS. However, the applicant stated, in the LRA, that it will manage change of material properties as a potential aging effect on concrete structures. In the LRA, the applicant stated that change of material properties for the Unit 2 containment due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," and AMP B2.1.23 "Structures Monitoring Program." The staff reviewed these programs and its evaluations are documented in Sections 3.0.3.2.11 and 3.0.3.2.16 of this SER, respectively.

(5) Corrosion of embedded steel - SRP-LR Section 3.5.2.2.1.1 states that loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

For cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only required if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm). The staff noted that the applicant credited the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. In addition, the applicant committed, in its structures monitoring program, to periodically monitor below-grade chemistry to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.

The staff finds that in accordance with the criteria of the GALL Report this aging effect is not significant and is adequately managed.

The staff reviewed the results of the applicant's AMR for inaccessible concrete areas. On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of aging of inaccessible concrete areas for the containment, as recommended in the GALL Report and ISG-3. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program In LRA Section 3.5.2.2.1.2, the applicant addressed (1) cracking, distortion, and increase in component stress level due to settlement, and (2) reduction of foundation strength due to erosion of porous concrete subfoundations in the containment.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 2. The applicant also stated that Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. Unit 2 has no de-watering system.

On the basis of its review, the staff concluded that foundation settlement is not an aging mechanism at Unit 2.

Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature. In LRA Section 3.5.2.2.1.3, the applicant addressed reduction of strength and modulus of concrete structures due to elevated temperature in containment.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits (i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F)).

In LRA Section 3.5.2.2.1.3, the applicant stated that during normal operation, all areas within the containment building do not experience elevated temperatures greater than 150 °F general and greater than 200 °F local. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 2 containment concrete.

On the basis of its review, the staff concurred with the applicant and concluded that change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 2 containment concrete.

Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate. In LRA Section 3.5.2.2.1.4, the applicant addressed loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate for the containment.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if the following specific criteria defined in the GALL Report cannot be satisfied: (1) concrete meeting the requirements of ACI 318 or ACI 349 and the guidance of ACI 201.2R was used for the containment concrete in contact with the embedded containment shell or liner; (2) the accessible concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner; (3) the accessible portion of the moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Subsection IWE requirements; (4) borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

In the LRA, the applicant stated that the containment concrete in contact with the steel liner plate is designed in accordance with ACI 318-63, and meets the recommendations or criteria of guideline ACI 201.2R-77. Accessible concrete of the containment structure is monitored for penetrating cracks under MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” In addition, the applicant stated, in the LRA, that the accessible portions of the steel liner plate and moisture barrier where the liner becomes embedded are inspected in accordance with MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” Spills (e.g., borated water spill) are cleaned up in a timely manner. The aging effect of loss of material due to corrosion has not been significant for the Unit 2 liner plate. The staff reviewed the inservice inspection program: containment inspections program, with exceptions, and its evaluation is documented in Section 3.0.3.2.11 of this SER.

On the basis of its review, the staff finds that all of the criteria identified in the GALL Report are satisfied. The staff finds that no additional, plant-specific aging management program is required to manage inaccessible areas of the steel containment liner plate.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature. As stated in SRP-LR, loss of prestress due to relaxation, shrinkage, creep, and elevated temperature is a TLAA, as defined in 10 CFR 54.3, and TLAAs must be evaluated in accordance with 10 CFR 54.21(c)(1). The staff documents its review of the applicant's evaluation of this TLAA in Section 4.5 of this SER. In performing this review, the staff followed the guidance in Section 4.5 of the SRP-LR.

Cumulative Fatigue Damage. As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

Cracking Due to Cyclic Loading and Stress Corrosion Cracking. In LRA Section 3.5.2.2.1.7, the applicant addressed aging mechanisms that can lead to cracking of penetration sleeves and penetration bellows, such as cyclic loads and SCC.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in containments. Further evaluation of inspection methods is recommended to detect cracking due to cyclic loading and SCC, since visual VT-3 examinations may be unable to detect this aging effect.

In LRA Section 3.5.2.2.1.7, the applicant stated that SCC is applicable to carbon and low-alloy steel in air only if the fabrication material is high yield-strength steel. SCC of stainless steel in air is only applicable to sensitized stainless steel that is exposed to intermittent wetting. Unit 2 containment penetrations, including penetration sleeves, bellows, and dissimilar metal welds, are not fabricated from high yield-strength steel and the stainless steel materials are not subject to intermittent wetting. Therefore, the applicant concluded that cracking due to SCC does not require aging management for the Unit 2 containment.

The staff reviewed and concurred with the applicant that cracking due to SCC is not an applicable aging effect for the Unit 2 containment, and augmented inspection to detect cracking is not necessary.

Cracking due to cyclic loading of the liner plate and penetrations is a TLAA which is evaluated and addressed in Section 4.6 of this SER.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of cracking due to SCC for containment components, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2.2 Class 1 Structures

The staff reviewed LRA Section 3.5.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2, which addressed several areas discussed below.

Aging of Structures Not Covered by Structures Monitoring Program. In LRA Section 3.5.2.2.2.1, the applicant addressed aging of Class 1 structures not covered by the structures monitoring program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structures monitoring program. This is described in GALL Report Chapter III and includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, and 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5 and 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5 and 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5 and 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, and 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundations for Groups 1-3 and 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5 and 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5 structures; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

Technical details of the aging management issue are presented in SRP-LR Subsection 3.5.2.2.1.2 for structure/aging effect combinations Items (5) and (6) and SRP-LR Subsection 3.5.2.2.1.3 for Item (8), above.

In LRA Table 3.5.1, Item 3.5.1-20 (page 3-432), the applicant credited MPS AMP B2.1.23, “Structures Monitoring Program,” for all types of aging effects and all component groups, except Group 6, of accessible interior and exterior concrete and steel components of Class 1 structures. The staff reviewed the structures monitoring program and its evaluation is documented Section 3.0.3.2.16 of this SER. Additional discussion of specific structure/aging effect combinations follows.

(1) Freeze-thaw - SRP-LR Section 3.5.2.2.2.1 addresses freeze-thaw as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if the applicant’s facility is subject to moderate to severe weather conditions, unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

    MPS is located in a region considered to be subject to severe weather conditions. In the LRA, the applicant stated that Unit 2 structures are designed in accordance with specification ACI 318-63, which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

    - high cement content

- low water-to-cement ratio
- proper curing
- adequate air entrainment

In addition to ACI 318-63, the applicant stated that Unit 2 concrete also meets the guideline of ACI 201.2R-77. ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

The staff interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed through MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

Because the concrete satisfies the criteria of ACI 318-63 will meet the requirements of ISG-3, and on the basis of an audit of operating experience evaluated under the structures monitoring program, the staff finds that loss of material and cracking due to freeze-thaw will be adequately managed by the structures monitoring program.

(2a) Leaching of calcium hydroxide - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in Class 1 structures. The GALL Report requires a plant-specific AMP for inaccessible areas, unless the criteria of ACI 201.2R-77 for Class 1 structural concrete are met.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the LRA, the applicant stated that Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the criteria of guideline ACI 201.2R-77.

The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff finds that because ACI 318-63 provides assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at Unit 2, and therefore concludes that the structures monitoring program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific aging management program is not required to address this aging effect.

(2b) Aggressive chemical attack - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of Class 1 structures. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is recommended to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the staff noted that the applicant uses the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

On the basis of its review of the information provided in the LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the staff finds that increases in porosity and permeability, loss of material (spalling, scaling), and cracking due to aggressive chemical attack are not significant for concrete in inaccessible areas. The staff finds that an appropriate aging management program for examination of below-grade concrete (specifically, an enhancement to the structures monitoring program) has been identified.

(3) Reaction with aggregates - SRP-LR Section 3.5.2.2.2.1 addresses reaction with aggregates as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the LRA, the applicant stated that Unit 2 concrete structures are designed in accordance with specification ACI 318-63 and meet the criteria of guideline ACI 201.2R-77. The ACI standard specifies testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the staff confirmed that the results of those tests showed that the aggregates used for concrete Class 1 structures at Unit 2 are not reactive. However, the applicant stated that it will manage cracking as a potential aging effect on concrete structures. In the LRA, the applicant stated that change of material properties and cracking due to alkali (cement)-aggregate reaction of concrete in various environments is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

(4) Corrosion of embedded steel - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of Class 1 structures. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

Also, for cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only necessary if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is recommended to examine representative samples of below-grade concrete when excavated for any reason.

The staff finds, in accordance with the criteria of the GALL Report, that these aging effects are not significant and are adequately managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also finds an enhancement to the structures monitoring program for examination of below-grade concrete to be acceptable.

(5) Settlement - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for the discussion of settlement. SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in Class 1 structures. Some plants may rely on a de-watering system to lower the site groundwater level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 2. The applicant stated that Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. Unit 2 has no de-watering system.

Based on the fact that Unit 2 structures are founded on bedrock, well-consolidated in-situ material or compacted fill without the use of porous concrete subfoundations, the staff concluded that foundation settlement is not an aging mechanism at Unit 2.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of settlement, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(6) Erosion of porous concrete subfoundation - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for the discussion of erosion of porous concrete subfoundation. SRP-LR Section 3.5.2.2.1.2 states that reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of Class 1 structures. Some plants may rely on a de-watering system to lower the site groundwater level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement, and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 2. Unit 2 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations. Unit 2 has no de-watering system.

Based on the fact that no Unit 2 structures utilize porous concrete subfoundations, the staff concluded that erosion of porous concrete subfoundation is not an aging mechanism at Unit 2.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of erosion of porous concrete subfoundation, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(7) Corrosion of structural steel components - SRP-LR Section 3.5.2.2.2.1 states that corrosion of structural steel components could occur and that further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

In LRA Section 3.5.2.2.2.1, the applicant stated that the aging effects associated with structures are managed by MPS AMP B2.1.23, "Structures Monitoring Program." However, aging effects for infrequently accessed portions of the structures are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program."

The staff reviewed the AMR results involving management of aging effects resulting from corrosion of structural steel components and confirmed that MPS AMP B2.1.23, "Structures Monitoring Program," and MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," address each of the affected structures and components. The staff reviewed these programs and its evaluations are documented in Sections 3.0.3.2.16 and 3.0.3.3.3 of this SER, respectively.

On the basis of this audit and review, the staff finds that the applicant has appropriately evaluated AMR results involving this aging effect and that corrosion of structural steel components is adequately managed by the structures monitoring program and infrequently accessed areas inspection program.

(8) Elevated temperatures - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.3 for the discussion of elevated temperatures. SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in Class 1 structures in Groups 1-5. The GALL Report calls for a plant-specific AMP and recommends further evaluation if any portion of the concrete components exceeds specified temperature limits (i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F)).

In LRA Section 3.5.2.2.1.3, the applicant stated that during normal operation, all general concrete areas in Class 1 structures remain below 150 °F and local area temperatures remain below 200 °F. Therefore, the applicant concluded that change in material properties due to elevated temperature is an aging effect not requiring management for Unit 2 Class 1 structures.

On the basis of its review, the staff concurred with the applicant and finds that change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 2 Class 1 structures.

(9) Aging effects for stainless steel liners for tanks - SRP-LR Section 3.5.2.2.2.1 states that crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures could occur and further evaluation is necessary only for structure/aging combinations not covered by the structures monitoring program.

The applicant stated, in the LRA, that no tanks with stainless steel liners are included in the structural AMRs. Tanks subject to an AMR are evaluated with their respective mechanical systems.

On the basis of its review, the staff concurred that no tanks with stainless steel liners are included in the structural AMRs.

Aging Management of Inaccessible Areas. In LRA Section 3.5.2.2.2.2, the applicant addressed aging of inaccessible areas of Class 1 structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack, and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects in inaccessible areas of Groups 1-3, 5, and 7-9 structures, if an aggressive below-grade environment exists. ISG-3 identifies additional recommendations.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack and corrosion of embedded steel is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is recommended to examine representative samples of below-grade concrete when excavated for any reason.

In LRA Section 3.5.2.2.2.2, the applicant stated that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). The applicant stated in the LRA that it credited the enhanced MPS AMP B2.1.23, “Structures Monitoring Program,” to examine below-grade concrete when it is exposed by excavation. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff finds that the structures monitoring program, as enhanced, is an appropriate program for examination of below-grade concrete when it becomes accessible.

The applicant stated, in the LRA, that inspections of accessible concrete have not revealed degradation from aggressive chemical attack or corrosion of embedded steel.

Because the below-grade environment is not aggressive, the applicant performed periodic groundwater monitoring considering seasonal variations. The staff finds that increases in porosity and permeability, loss of material (spalling, scaling) cracking due to aggressive chemical attack, and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are adequately managed for concrete in inaccessible areas.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of inaccessible areas, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2.3 Component Supports

The staff reviewed LRA Section 3.5.2.2.3 against the criteria in SRP-LR Section 3.5.2.2.3, which addresses several areas discussed below.

Aging of Supports Not Covered by Structures Monitoring Program. In LRA Section 3.5.2.2.3.1, the applicant addressed aging of component supports that are not managed by the structures monitoring program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1-B5 supports; (2) loss of material due to environmental corrosion for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

The applicant, in the LRA, has included the GALL Report AMP under the applicant's general MPS AMP B2.1.23, "Structures Monitoring Program." However, this program is not consistent with the GALL Report since the component groups are not completely within the scope of the applicant's structures monitoring program, thus requiring further evaluation. The applicant stated in LRA Section 3.5.2.2.3.1 that the structures monitoring program only manages aging effects associated with large equipment supports. The applicant also stated that MPS AMP B2.1.13, "General Condition Monitoring," is used to manage aging effects for supports for other components and piping, and MPS AMP B2.1.1, "Battery Rack Inspections," is used to manage age-related degradation specific to battery supports. The aging effects for supports in infrequently accessed areas are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program." The staff reviewed these programs and its evaluations are documented in Sections 3.0.3.3.2, 3.0.3.3.1, and 3.0.3.3.3 of this SER, respectively. The staff finds the structures monitoring program acceptable, in conjunction with the other three programs, for managing aging of component supports for all GALL Report component support groups.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of aging of components supports, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cumulative Fatigue Damage Due to Cyclic Loading. As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.5A.2.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides a separate evaluation of the applicant's Quality Assurance Program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.5.2-1 through 3.5.2-27 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effect requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In Tables 3.5.2-1 through 3.5.2-27, the applicant indicated, via Notes F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effect requiring management will be managed.

Staff Evaluation. For component type, material and environment combination that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff evaluation is discussed below.

3.5A.2.3.1 Unit 2 Containment - Aging Management Evaluation -Table 3.5.2-1

The staff reviewed Table 3.5.2-1 of the LRA, which summarized the results of AMR evaluations for the Unit 2 containment system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for containment.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer tube gate valve, containment sump screen, neutron shield tank, reactor cavity seal ring, refueling cavity liner, pipe, valve bodies, fuel transfer tube, expansion bellows, and fuel transfer tube penetration component types. Air is not identified in the GALL Report as an environment for these components and material.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that, based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant stated in the LRA that change of material properties for equipment pads/grout, jet impingement barriers, and structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, and walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant stated in the LRA that change of material properties for containment shell (cylindrical wall and dome), and tendon gallery due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," with exceptions. The staff reviewed the program and its evaluation is documented in Section 3.0.3.2.11 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

For item numbers 3.5.1-03 to 3.5.1-06 (Table 3.5.1) of the LRA, the applicant cited containment ISI and containment leak rate test as the aging management programs. A review of AMP B2.1.6 indicated that the Appendix J leak rate testing is part of the ISI Program: Containment Inspections. In the Appendix J program, the applicant takes credit for only Type A tests to measure the overall primary containment leakage rates. This is a major deviation from NUREG-1801, Section XI.S4 program. Also, the review indicated that the applicant was taking credit for the 1998 Edition of Subsections IWE of Section XI of the ASME Code, without citing compliance with the limitations and modifications associated with this Edition of the Code in 10 CFR 50.55a (67 FR 60520). The staff identified this as a major deviation from NUREG-1801 Section XI.S1 program and the requirements of the regulation. In view of these deviations, and the fact that the Type A leak rate testing may occur every 10 to 15 years, the applicant was requested to provide information as to how it planned to monitor the aging and leak-tightness of the components covered by item numbers 3.5.1-03 to 3.5.1-06. The applicant was also requested in RAI 3.5-1 to address seals and gaskets associated with equipment hatches, air locks, and, electrical and mechanical penetrations.

This item was identified as Audit Item 47 during the AMP/AMR Audit conducted the week of May 3, 2004. Dominion provided a supplemental response to Audit Item 47 as in a letter dated July 7, 2004. In this response, the applicant stated that the Millstone LRA has been supplemented to additionally credit Type B Local Leak Rate Tests (in accordance with 10 CFR 50, Appendix J) as part of the containment isi aging management program. Type B Local Leak Rate Testing will ensure that the containment pressure boundary function associated with the seals and gaskets for equipment hatches, air-locks, and, electrical and mechanical penetrations will be maintained during the period of extended operation.

The typical frequency for performing Type B Local Leak Rate tests is every four refueling outages (approximately every six years). Twenty-five percent of Type B electrical penetrations are performed on-line just prior to or following each refueling outage (approximately every 1 ½ years).

The staff finds the response to RAI 3.5-1 acceptable as the implementation of the revised process will assure the integrity of the containment pressure boundary penetrations during the period of extended operation.

In RAI 3.5-4, the staff inquired about the means of monitoring the temperatures of the containment concrete (around the high energy lines) and that of the concrete structures inside the containments, and the operating experience related to their degradation, as follows:

> In addressing item 3.5.1-27, for the reinforced concrete structures subjected to elevated temperatures (e.g., primary shield walls, pressurizer and steam generator enclosures, reactor vessel supports, and the containment concrete around high energy penetrations) the applicant stated: "NUREG-1801 is not applicable." Items IIA1.1-h and III.A4-1c of NUREG-1801 are directly applicable to Group 4 structural concrete. For these structures, the applicant is requested to provide the following information:
>
> 1. The method(s) of monitoring the concrete temperatures in these structures.
> 2. If the primary shield wall concrete, the containment concrete, or any other structural components within Millstone 2 and 3 containments are kept below the threshold temperature (i.e. 150°F) by means of air cooling, provide the operating experience related to the performance of the cooling system.
> 3. The results of the latest inspection of these structures, in terms of cracking, spalling, and condition of reactor vessel support structures, etc.

By letter dated November 9, 2004, the applicant stated as follows:

1. For Millstone Unit 2, the temperature of the primary shield wall concrete in the area of the reactor vessel supports is monitored and an alarm is provided in the control room if the temperature exceeds 150 °F. Embedded cooling coils are provided at these locations to remove heat from the concrete. Although not directly measured, the temperature of the concrete in other areas of the Unit 2 containment, and in the Unit 3 containment, is maintained below threshold values by the design of ventilation systems. The containment ventilation systems maintain average containment internal air temperature below 120 °F in accordance with Technical Specification requirements. Local ambient air temperatures in areas such as the steam generator cubicles and the pressurizer cubicle are maintained well below 150 °F. The localized concrete temperature in the vicinity of high energy piping containment penetrations is maintained below the threshold value by the containment penetration cooling system, which consists of a ventilation system in Unit 2 (the Containment Penetration Cooling System described in LRA Section 2.3.3.18) and a water cooling system in Unit 3 (as part of the Reactor Plant Component Cooling System described in LRA Section 2.3.3.6).

2. The containment ventilation systems operate consistently in order to provide compliance with Technical Specification containment average temperature limit of 120 °F. Failures of these systems to provide adequate cooling requires plant shutdown and, therefore, the threshold values for concrete temperature would not be exceeded. The containment concrete in the area of the Unit 2 high energy piping penetrations is cooled by the containment penetration cooling system. A review of plant operating experience has indicated that this system also operates consistently and there are no identified failures that would have resulted in local concrete temperatures exceeding threshold values.

3. The latest inspections of the containment structure were performed in March 2001 and October 2003 for Unit 2 and in September 2002 for Unit 3. These inspections did not identify instances of significant cracking or spalling in the primary shield wall, pressurizer and steam generator enclosures, reactor vessel support concrete, or the containment concrete around high-energy penetrations. These inspection results provide further assurance that elevated temperature of containment concrete is not a significant concern for Millstone Unit 2 and Unit 3 containments.

The staff finds the response acceptable, as the applicant employs positive means to control temperatures around the high energy containment penetrations as well as around the areas likely to be subjected to elevated temperatures in the concrete.

In RAI 3.5-14, the staff requested information regarding the operating experience related to corrosion of steel liner for Millstone Units 2 and 3. Specifically, in discussion of Item 3.5.1-12 in Section 3.5.2.2.1.4, the applicant noted that the moisture barrier is monitored under containment inspection program for aging degradation. The industry experience indicates that the moisture barrier degrades with time, and any moisture accumulation in the degraded barrier corrodes the steel liner. The applicant was requested to provide information regarding the operating experience related to the degradation of moisture barrier and the containment liner plate at

Millstone 2 and 3. The applicant was requested to include a discussion of acceptable liner plate corrosion before it was reinstated to the nominal thickness.

In response, the applicant provided the following responses.

The containment ISI program conforms to ASME XI Subsection IWE (1998 Edition) for monitoring the effects of aging associated with both the moisture barrier and the steel liner. The inspection of moisture barriers is intended to prevent undetected intrusion of moisture to inaccessible areas of the pressure retaining liner. Subsection IWE identifies the moisture barrier examination method (visual), and the examination extent and frequency (100% each inspection period). By Subsection IWE requirements, the acceptance standards are “owner defined.” Millstone Units 2 and 3 have defined the general and detailed visual acceptance criteria in plant-specific procedures. For augmented examinations of the liner that involve Ultrasonic Testing (UT), ASME Section XI, Subparagraph IWE-3511.3 requires that loss of material in a local area projected to exceed 10% of the nominal wall thickness prior to the next examination shall be documented. Such areas are entered into the corrective action program and either accepted by engineering evaluation or corrected by performance of repair/replacement activities.

For Millstone Units 2 and 3, various examples of operating experience associated with the moisture barrier and the liner (such as the results of baseline examinations performed under the containment isi program) are available for review at the station. The extent of the visual examinations and the necessity of additional volumetric examinations have been as specified in the IWE Inspection Schedule. Examples of containment operating experience for Millstone Units 2 and 3 are provided in the License Renewal Application Appendix B (Section B2.1.16).

Millstone Unit 2

The moisture barrier for the Unit 2 containment liner was inspected in 2000 as part of the ASME Section XI, Subsection IWE examinations. The inspection revealed indications, which upon evaluation required that the moisture barrier material be removed, a detailed IWE examination of the liner be performed, the liner be recoated, and the moisture barrier be replaced. The work scope was completed in two phases, approximately 50% of the locations in outage 2R13 and the remainder in outage 2R15. During the examination, some pitting of the liner was observed and determined to be acceptable by engineering evaluation and the requirements of Subsection IWE of ASME Section XI and acceptable for continued service.

Millstone Unit 3

In 2000 the moisture barrier for the Unit 3 containment liner was inspected as part of the ASME Section XI, Subsection IWE examinations. The inspection revealed unacceptable results where, for specific areas, the moisture barrier had not been installed. These areas were documented and repaired in accordance with Subsection IWE requirements. Detailed visual examinations of the moisture barrier are performed as directed by IWE requirements and the Millstone containment ISI program. The liner surface for the depth of the exposed joint was acceptable and required no further supplemental examination.

Recognizing the susceptibility of the below grade portion of the containment liners to corrosion, in a follow-up request, the staff requested the applicant to provide information regarding corrosion of the liners above the bottom floor levels. By letter dated December 3, 2004, the applicant provided detailed descriptions of the liner corrosion, and the results of UT measurements taken for Unit 2 in April 2000, May 2000, March 2002, and in November 2003 for Unit 2, and in February 2001 for Unit 3. A typical evaluation of liner corrosion consisted of the following approach:

> Specifically, the UT examination results indicated that the area in question had a liner wall thickness of 0.239 inches. The design nominal thickness of the liner is 0.250 inches. In accordance with ASME Section XI, Subparagraph IWE 3122.3, local areas exhibiting less than 10% wall loss are acceptable for continued service. The reading of 0.239 inches was greater than the 0.225 inches minimum wall thickness allowable (for 10 % wall loss), and therefore, met the acceptance standards of ASME Section XI.

The description also included examples where the liner thickness was found to be more than 10% of the nominal thickness allowed by Subsection IWE of Section XI of the ASME Code. In those cases the applicant performed engineering analysis to demonstrate that the liner could perform its intended function.

The above description clearly indicates that the below grade portions of the liner plate have been subjected to corrosion, and the applicant was taking appropriate actions to monitor and control the future instances of corrosion. The staff believes that an appropriate implementation of AMP B.2.1.16, “Inservice Inspection Program: Containment Inspection,” including its containment leak rate testing program will monitor and control corrosion of liner plates during the period of extended operation, and therefore, finds the process used by the applicant acceptable.

In RAI 3.5-15, for Millstone 2 only, the staff requested information regarding the condition of prestressing tendons located below the grade level. Specifically, a review of Appendix 5F of the Millstone 2 FSAR indicates that the hoop and vertical tendons located in the below-grade portion of the containment have experienced continuous problem of water leakage through them. The corrective action adopted for the hoop tendons is to keep the sheathing filler in the affected tendons at pressures slightly above hydrostatic pressure. For this sustained condition the applicant was requested to describe the conditions of vertical tendons affected by the water leakage. For the purpose of lift-off testing during tendon surveillance, the applicant was asked whether it selected some tendons from these affected tendons as additional samples. Third, the hydrostatic pressure on the hoop tendons at the bottom of the cylinder could be significant. Such high-sustained pressures could give rise to leakage of corrosion protection medium (CPM) from the sheathing (see Trojan Plant experience in NUREG-1522). The applicant was asked to provide an assessment of the CPM leakage and presence of water for the affected tendons in terms of the acceptance criteria in IWL-3221.2, IWL-3221.3, and IWL-3221.4.

By letter dated November 9, 2004, the applicant provided the following responses.

First, the Millstone Unit 2 containment structure is environmentally protected by an Enclosure Building, which eliminates most degradation mechanisms. Operating experience has been provided in LRA Appendix B (Section B2.1.16) regarding the long-term effects of water intrusion. The discussion specifically states that the condition of the tendon gallery has improved and water intrusion has decreased. This section also discusses the 25th year physical surveillance of Millstone Unit 2 containment post-tensioning performed in accordance with ASME Section XI, Subsection IWL requirements, and includes the results of the tendon surveillance examinations and tests. The section identifies that the losses in tendon forces were less than expected for a plant of its age, and concludes that the containment structure has experienced no abnormal degradation of the post tensioning system. The section identifies that a regression analysis of the tendon forces was performed, which predicts that the values will remain above minimum design requirements well beyond the next surveillance interval.

The 25th year physical surveillance for Millstone Unit 2 included the inspection of anchorage components. Grease caps were selected and removed in accordance with Subsection IWL requirements, and a complete grease coating was found for all tendon ends inspected including those vertical tendons selected. All wire samples were acceptable for diameter, corrosion condition, and physical properties. All tendons were resealed and regreased, with no more than 10% duct volume added.

The presence of water was found in one surveillance tendon (vertical tendon 31V24). The amount of free water present was 16 ounces (Note: The total grease net duct volume for this tendon is 191.94 gallons). This same vertical tendon had also been selected for lift-off testing with satisfactory results. The grease caps for the adjacent tendons (31V22, 31V23 and 31V25) were removed for examination of the tendon ends. No free water was present, and the CPM was tested with satisfactory results. The anchor head corrosion condition of all four tendons was excellent and no broken wires were found. In addition, the exterior of tendon anchorage grease cans (including all vertical tendons) were inspected for the presence of water and grease leaks and none were found."

Second, Millstone Unit 2 does not select any additional tendons from the affected hoop tendons for lift-off testing, and only tests those affected tendons that were selected to comply with ASME Section XI, Subsection IWL requirements. When affected tendons are lift-off tested in accordance with IWL requirements, Millstone Unit 2 lift-off tests the adjacent tendons as additional samples in accordance with Subsection IWL should unsatisfactory lift-off test results be identified for the affected tendons."

As a result of the Millstone Unit 2 tendon surveillance program, seventeen hoop tendons were identified as subject to groundwater intrusion. These tendons were modified to ensure that grease is continuously supplied at a pressure that is slightly above the hydrostatic pressure of the groundwater. The number of tendons containing water has significantly reduced from the ten tendons identified during the third and fourth tendon surveillances to only one tendon identified during each of the last two surveillances. For the tendon identified with free water during the last surveillance (12H01), an inspection of head revealed acceptable levels of corrosion with no button heads missing (other than those intentionally removed for corrosion inspection). The CPM for each of the identified seventeen hoop tendons was sampled and replaced during the 25th year physical surveillance. The analysis of the CPM samples taken from each tendon showed acceptable results for all tests (ions, water and neutralization number). These grease replacement tendons were also successfully filled with no more than 10% net duct volume added, as required in accordance with Subsection IWL.

As previously identified, the operating experience for Millstone Unit 2 identifies that the condition of the tendon gallery has improved, the water intrusion has decreased, and the containment structure has experienced no abnormal degradation of the post tensioning system.

The staff considers the inspection and maintenance activities associated with the below grade tendons acceptable, as the continuation of the process during the period of extended operation will manage the aging of these corrosion susceptible tendons. Additional discussion regarding the selection of these tendons for examination and lift-off testing is discussed in Section 4.5 of this SER.

3.5A.2.3.2 Unit 2 Containment Enclosure Building - Aging Management Evaluation - Table 3.5.2-2

The staff reviewed Table 3.5.2-2 of the LRA, which summarized the results of AMR evaluations for the Unit 2 containment enclosure building component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for Class 1 structures.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant also stated in the LRA that change of material properties for flood/spill barriers including curbs, dike, toe plates and stop logs, and structural reinforced concrete (caisson, floor slabs, grade beams, slabs on grade, and walls), due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant also stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete to be of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (caisson, floor slabs, grade beams, slabs on grade, and walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

Tables 3.5.2-2 of LRAs for both Units 2 and 3 are related to the aging management of the enclosure buildings surrounding the containments. For Unit 2, the applicant incorporated the aging management of blow-off panels. This was not the case for Unit 3. In RAI 3.5-16 the applicant was requested to discuss the reasons for the difference.

By letter dated December 3, 2004, the applicant stated that the main steam lines for Millstone Unit 2 go through the enclosure building, and the potential exists for excessive pressure to build-up inside this building during a main steam line leak. For this reason blow-off panels were incorporated into the Unit 2 enclosure building design, and the aging management of these blow-off panels has been included for License Renewal.

The applicant further stated that the main steam lines for Millstone Unit 3 go through the main steam valve building, and not the enclosure building. For this reason blow-off panels are installed in the main steam valve building, and the aging management of these blow-off panels has been included for License Renewal. Because the main steam lines for Millstone Unit 3 do not go through the enclosure building, the potential for excessive pressure to build-up inside this building does not exist, and blow-off panels were not installed.

The staff finds the clarification acceptable.

3.5A.2.3.3 Unit 2 Auxiliary Building - Aging Management Evaluation - Table 3.5.2-3

The staff reviewed Table 3.5.2-3 of the LRA, which summarized the results of AMR evaluations for the Unit 2 auxiliary building component groups. The staff interviewed the applicant's technical staff and reviewed Unit 2 Technical Report MP-LR-3602, "Class 1 Structures," Revision 3.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including miscellaneous steel (embedded steel exposed surfaces, shapes, plates, unistrut, etc.), ladders, platforms, grating, and stairs component types. Air is not identified in the GALL Report as an environment for these components and material.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including metal smoke barrier and control room ceiling support component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to air, including the control room ceiling panel component type. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant also stated, however, that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant also stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, slabs on grade, and walls), and tunnels component types due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant further stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Nevertheless, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, slabs on grade, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP

B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that loss of material for stainless steel spent fuel storage racks exposed to treated water is managed using AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The staff finds that this program is consistent with GALL AMP XI.M2, “Water Chemistry,” with an acceptable exception. Since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect, the staff finds this to be acceptable.

3.5A.2.3.4 Unit 2 Warehouse Building - Aging Management Evaluation - Table 3.5.2-4

The staff reviewed Table 3.5.2-4 of the LRA, which summarized the results of AMR evaluations for the Unit 2 warehouse building system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls), and tunnels component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures’ concrete to be of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including cask wash pit liner and new fuel rack assembly component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components are expected to experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.5A.2.3.5 Unit 2 Turbine Building - Aging Management Evaluation - Table 3.5.2-5

The staff reviewed Table 3.5.2-5 of the LRA, which summarized the results of AMR evaluations for the Unit 2 turbine building system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates and stop logs, structural reinforced concrete (floor slabs, footing and grade beams, pedestals, roof slabs, slabs on grade, spread footing, and turbine pedestal walls), and hatches component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Nevertheless, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, footing and grade beams, pedestals, roof slabs, slabs on grade, spread footing, and turbine pedestal walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.6 Unit 1 Turbine Building - Aging Management Evaluation - Table 3.5.2-6

The staff reviewed Table 3.5.2-6 of the LRA, which summarized the results of AMR evaluations for the Unit 1 turbine building system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 2, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring

Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for carbon steel H-piles components exposed to soil. The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for Class 1 structures, that for carbon steel in a soil environment, there are no potential aging mechanisms for this carbon steel and environment combination. The applicant stated that test data indicated that undisturbed soils are deficient in oxygen at levels a few feet below the ground surface or below the water table. Carbon steel piles driven into undisturbed soils are not appreciably affected by corrosion, regardless of the soil type or the soil properties. The effects of corrosion are negligible for well-compacted soil because it does not contain sufficient oxygen. Therefore, the applicant finds that the loss of material due to corrosion is not a potential aging mechanism.

On the basis of its review of the applicant’s documentation, the staff concurred with the applicant and finds that loss of material due to corrosion is not a potential aging effect. Therefore, the staff finds that, for carbon steel in a soil environment, there is a negligible aging mechanism for this carbon steel and environment combination.

3.5A.2.3.7 Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation - Table 3.5.2-7

The staff reviewed Table 3.5.2-7 of the LRA, which summarized the results of AMR evaluations for the Unit 1 control room and radwaste treatment building system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete from being of concern. Nevertheless, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.8 Unit 2 Fire Pump House - Aging Management Evaluation - Table 3.5.2-8

The staff reviewed Table 3.5.2-8 of the LRA, which summarized the results of AMR evaluations for the Unit 2 fire pump house system component groups. The staff interviewed the applicant's technical staff and reviewed AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using AMP B2.1.23, "Structures Monitoring Program." The applicant also stated that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms, which require aging management.

The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs and roof slabs) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

3.5A.2.3.9 Unit 3 Fire Pump House - Aging Management Evaluation - Table 3.5.2-9

The staff reviewed Table 3.5.2-9 of the LRA, which summarized the results of AMR evaluations for the Unit 3 fire pump house system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using AMP B2.1.23, "Structures Monitoring Program." The applicant stated that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms, which require aging management.

The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, and roof slabs) component types in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

3.5A.2.3.10 SBO Diesel Generator Enclosure and Fuel Oil Tank Vault - Aging Management Evaluation - Table 3.5.2-10

The staff reviewed Table 3.5.2-10 of the LRA, which summarized the results of AMR evaluations for the SBO diesel generator enclosure and fuel oil tank vault system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR miscellaneous structures, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in its MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structures, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in its MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs) component types in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated, in the LRA, that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete to be of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.11 Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation - Table 3.5.2-11

The staff reviewed Table 3.5.2-11 of the LRA, which summarized the results of AMR evaluations for the Unit 2 condensate polishing facility and warehouse no. 5 system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, and walls) component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.12 Security Diesel Generator Enclosure - Aging Management Evaluation - Table 3.5.2-12

The staff reviewed Table 3.5.2-12 of the LRA, which summarized the results of AMR evaluations for the security diesel generator enclosure system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing, siding, and structural framing component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structures, that for aluminum in an air environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air environment, there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structures, that for aluminum in an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in its MAER that for aluminum material in an atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete. However, the NRC staff has expressed concerns regarding aging of concrete. Therefore, the applicant will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.13 Stack Monitoring Equipment Building - Aging Management Evaluation - Table 3.5.2-13

The staff reviewed Table 3.5.2-13 of the LRA, which summarized the results of AMR evaluations for the stack monitoring equipment building system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that cracking for concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using AMP B2.1.23, “Structures Monitoring Program.” The applicant stated that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms, which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, and walls) component types in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.14 Millstone Stack - Aging Management Evaluation -Table 3.5.2-14

The staff reviewed Table 3.5.2-14 of the LRA, which summarized the results of AMR evaluations for the MPS stack system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete to be of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures in infrequently accessed areas.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, and walls) component types in infrequently accessed areas in an air environment is managed by AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” which is a plant-specific program. The staff reviewed the infrequently accessed areas inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5A.2.3.15 Switchyard Control House - Aging Management Evaluation - Table 3.5.2-15

The staff reviewed Table 3.5.2-15 of the LRA, which summarized the results of AMR evaluations for the switchyard control house system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that cracking of concrete (masonry block walls) component types exposed to an atmosphere/weather environment is managed using AMP B2.1.23, “Structures Monitoring Program.” The applicant also stated that cracking of masonry block walls due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long-term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.16 Retaining Wall - Aging Management Evaluation - Table 3.5.2-16

The staff reviewed Table 3.5.2-16 of the LRA, which summarized the results of AMR evaluations for the retaining wall system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footing and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.17 345kV Switchyard - Aging Management Evaluation - Table 3.5.2-17

The staff reviewed Table 3.5.2-17 of the LRA, which summarized the results of AMR evaluations for the 345kV switchyard system component groups. The staff interviewed the applicant's technical staff and reviewed AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.18 Unit 2 Intake Structure - Aging Management Evaluation - Table 3.5.2-18

The staff reviewed Table 3.5.2-18 of the LRA, which summarized the results of AMR evaluations for the Unit 2 intake structure system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) and hatches component types in an air environment is managed by AMP B2.1.23, "Structures Monitoring

Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) and hatches component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. During the audit and review, the staff expressed concerns regarding aging of concrete. The applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls) component types in a sea water environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

In RAI 3.5-7, the staff requested information about the members that will be monitored by the structures monitoring program and infrequently accessed area inspection program as follows:

> Structures Monitoring Program and Infrequently Accessed Area Inspection Program were listed as AMPs for Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls) under column "Structural Member" and under

column “Notes” H, 20 in Tables 3.5.2-18 for Unit 2 and H, 23 in Table 3.5.2-27 for Unit 3. Please identify the structural components, such as beams and walls that are managed by either program or by both programs and provide basis for the selection of the program.

By letter dated November 9, 2004, the applicant stated that the structural member "Structural Reinforced Concrete" in Unit 2 LRA Table 3.5.2-18 and Unit 3 LRA Table 3.5.2-27 includes beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls. The structural reinforced concrete components associated with the table line item with Note H, 20 (Unit 2) or H, 23 (Unit 3) are only the floor slabs, foundation mat slabs, and walls. As indicated in Note 20 in the Unit 2 LRA table (or Note 23 in the Unit 3 LRA table), the infrequently accessed area inspection program manages the effects of aging for structural members/components in the intake structure water bays between the waterline and the bottom of the intake structure operating deck since this area is infrequently accessed as described in LRA Appendix B, Section b2.1.15. The structures monitoring program manages the effects of aging for structural members/components in the water bay below the waterline since this area is inspected by the structures monitoring program AMP. The effects of aging for the walls are managed by both the infrequently accessed areas inspection program (above the waterline) and the structures monitoring program (below the waterline). The infrequently accessed area inspection program manages the effects of aging for the floor slabs (underside of the operating deck) and the structures monitoring program manages the effects of aging for the foundation mat slabs.

The staff finds the applicant’s response acceptable because it identifies each structural component and its associated AMP.

3.5A.2.3.19 Sea Walls - Aging Management Evaluation - Table 3.5.2-19

The staff reviewed Table 3.5.2-19 of the LRA, which summarized the results of AMR evaluations in the SRP-LR for the sea walls system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footings and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. However, the NRC staff has expressed concerns regarding aging of concrete. Therefore, the applicant will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footings and walls) component types in a sea water environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation of this program is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. For these components, the staff finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

3.5A.2.3.20 Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation - Table 3.5.2-20

The staff reviewed Table 3.5.2-20 of the LRA, which summarized the results of AMR evaluations for the Unit 2 discharge tunnel and discharge structure system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, roof slabs, and walls) component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, roof slabs, and walls) component types in a sea water environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

3.5A.2.3.21 Unit 2 Bypass Line - Aging Management Evaluation - Table 3.5.2-21

The staff reviewed Table 3.5.2-21 of the LRA, which summarized the results of AMR evaluations for the Unit 2 bypass line system component groups.

In RAI 3.5-13, the staff requested a clarification as to the reason Table 3.5.2-21 of Unit 2 and Table 3.5.2-31 of Unit 3 listed infrequently accessed area inspection program three times as the AMP for concrete pipes. The applicant was requested to explain the reason for listing the program three times.

By letter dated November 9, 2004, the applicant stated that each line item for concrete pipe in Unit 2 LRA Table 3.5.2-21 on page 3-507 and in Unit 3 Table 3.5.2-31 on page 3-613 was a unique line item with a corresponding NUREG-1801 Volume 2 Item and/or a note. As a result, some table data (such as the AMP) was repeated multiple times for these lines. For example, for the lines in the tables associated with the change of material properties aging effect for the concrete pipe, the first line is associated with NUREG-1801 item III.A6.1-b for the leaching of calcium hydroxide aging mechanism. The second line is associated with NUREG-1801 item III.A6.1-e for the aggressive chemical attack aging mechanism. Finally, the third line is not associated with a NUREG-1801 item since the alkali-aggregate reaction aging mechanism leading to a change of material properties is not included in NUREG-1801, although Dominion has conservatively included this aging mechanism as discussed in LRA Appendix C, Section C3.2.2. For each of these aging mechanisms that result in the change of material properties aging effect for the concrete pipe, the infrequently accessed areas inspection program AMP manages the identified aging effect.

The staff finds the applicant’s response acceptable because it provided the reason for listing the infrequently accessed area inspection program as AMP three times for concrete pipes.

3.5A.2.3.22 Tank Foundations - Aging Management Evaluation - Tables 3.5.2-22 and 3.5.2-22a

The staff reviewed Table 3.5.2-22 of the LRA and Table 3.5.2-22a of the Applicant’s supplement dated January 11, 2005, which summarized the results of AMR evaluations for the tank foundations system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs and walls) of the CST foundation and missile barrier, structural reinforced concrete (footing) of the fire water tanks 1 and 2 foundations, structural reinforced concrete of the diesel fuel oil storage tank foundation, and structural reinforced concrete (foundation mat slabs) of the RWST foundation and SBO diesel fuel oil storage tank foundation component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the Applicant’s supplement dated January 11, 2005, the applicant stated that change of material properties of concrete for the structural reinforced concrete of the Unit 2 primary water storage tank in an atmosphere/weather environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effect of change in material properties of concrete in an atmosphere/weather environment.

3.5A.2.3.23 Yard Structures - Aging Management Evaluation - Table 3.5.2-23

The staff reviewed Table 3.5.2-23 of the LRA, which summarized the results of AMR evaluations for the yard structures system component groups. The staff interviewed the applicant’s technical staff and reviewed the AMR technical justification for miscellaneous structures.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including the lighting poles component type. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for miscellaneous structures, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, and walls) of the RWST valve pit, hatches of pipe trenches, and structural reinforced concrete (foundation mat slabs and walls) of pipe trenches component types in an air environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcements to control cracking, prevents the leaching of calcium hydroxide from structural concrete from being of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footings and walls) of transformer firewalls and dikes, structural reinforced concrete of the A700 switchgear enclosure dike, structural reinforced concrete (footing) of the diesel fuel oil storage tank dike, structural reinforced concrete (foundation mat slabs, roof slabs, and walls) of the RWST valve pit, hatches of pipe trenches, and structural reinforced concrete (footing) of security lighting supports component types due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5A.2.3.24 NSSS Equipment Supports - Aging Management Evaluation - Table 3.5.2-24

The staff reviewed Table 3.5.2-24 of the LRA, which summarized the results of AMR evaluations for the NSSS equipment supports system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for NSSS equipment supports.

In the LRA, the applicant stated that the GALL Report does not include a borated water leakage environment for the copper alloy steam generator support sliding support assembly component type. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for NSSS equipment supports, that for copper alloys in a borated water leakage environment, boric acid corrosion Is an aging mechanism for loss of material. The applicant stated that these components do not exceed the temperature threshold of 350 °F. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the staff concurred with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the LRA, the applicant stated that loss of material for the copper alloy steam generator support sliding support assembly component type in a borated water leakage environment is managed by AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program manages these aging effects by visual inspections for evidence of degradation or adverse conditions and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the staff finds the general condition monitoring program acceptable to manage the aging effect of loss of material for copper alloys for this environment.

In the discussion section of LRA Table 3.5.1, Item 3.5.1-33, the applicant stated, for Group B1.1: high strength low-alloy bolts in structures and component support systems, that cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting.

During the audit and review, the staff noted that SRP-LR Table 3.5-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing high strength bolting for NSSS components supports for crack initiation and growth due to SCC.

By letter dated January 11, 2005, the applicant stated:

> For NSSS component supports, bolting material with estimated maximum yield strength that marginally exceeds 150 ksi is used in limited applications. This bolting is located inside the Containment in areas where the environment is typically dry and not subject to high levels of contaminants, such as halogens and sulfur compounds, that result in the potential for SCC. Leakage within the Containment is monitored and strictly controlled during plant operation and is investigated and corrected such that the potential for wetting of NSSS component support bolting is minimal. Based on the marginally susceptible bolting materials and a dry, non-conducive (benign) service environment, cracking due to SCC is not an aging effect requiring management for this bolting.
>
> As identified in Millstone Power Station Unit 2 LRA Table 3.5.2-24 and Millstone Power Station Unit 3 LRA Table 3.5.2-35, loss of material is conservatively considered an aging effect requiring management for NSSS component support bolting and is managed by

the Inservice Inspection Program: Systems, Components and Supports AMP (which includes the elements of the ASME Section XI, Subsection IWF requirements as described in LRA Appendix B2.1.18). In addition, loss of material due to the potential for borated water leakage from nearby components is managed by the boric acid corrosion and general condition monitoring AMPs.

Since the boric acid corrosion and general condition monitoring programs ensure a dry, non-conducive (benign) service environment and the bolting material is managed by the inservice inspection program, the staff finds this acceptable.

3.5A.2.3.25 General Structural Supports - Aging Management Evaluation - Table 3.5.2-25

The staff reviewed Table 3.5.2-25 of the LRA, which summarizes the results of AMR evaluations for the general structural supports system component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for general structural supports.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including structural support components (plate structural shapes, etc.), vendor-supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.), and sliding support bearing and sliding surfaces component types.

During the audit and review, the staff questioned the applicant as to why the AMP B.2.1.18, "Inservice Inspection Program: Systems, Components and Supports," was not credited to manage loss of mechanical function, as described in the GALL Report. By letter dated January 11, 2005, the applicant stated that the inspection requirements for these supports associated with ASME XI IWF that are part of the CLB will carry forward to the period of extended operation.

On the basis of its review, the staff concurred with the applicant concerning the adequacy of inspections in accordance with ASME XI IWF.

The applicant also stated in the LRA that the sliding support assemblies within this component group include parts that are subject to relative motion. Therefore, the components may be exposed to hard particles that slide or roll across component surfaces under pressure. The portions of the support assembly that experience relative motion are in contact with Teflon based Fluorogold pads for low friction. Additionally, the relative motion is a result of thermal growth of the piping systems due to plant heat-up and cool-down cycles. The plant thermal cycles occur relatively infrequently and result in limited actual motion for wear to occur. Erosion (wear) of the surfaces is expected to be insignificant and erosion is not a potential aging mechanism. Therefore, no aging effects are applicable to this component/commodity group. On the basis of its review, the staff concurred with the applicant and finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for galvanized steel components exposed to air, including electrical conduit and cable tray component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon (galvanized steel) steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for general structural supports, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant stated that the GALL Report does not include a borated water leakage environment for copper alloy sliding support bearing and sliding surfaces component types. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for general structural supports, that for copper alloys in a borated water leakage environment, boric acid corrosion is an aging mechanism for loss of material. The applicant stated that these components do not exceed the temperature threshold of 350 °F. On the basis of its review of the applicant's document, the staff concurred with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the LRA, the applicant stated that loss of material for copper alloy sliding support bearing and sliding surfaces component types in a borated water leakage environment is managed by AMP B2.1.13, "General Condition Monitoring," which is a plant-specific program. The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program manages these aging effects by visual inspections for evidence of degradation or adverse conditions, and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the staff finds that the general condition monitoring program is acceptable for managing the aging effect of loss of material for copper alloys for this environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for general structural supports, that for aluminum in an air or an atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination. The applicant stated in its MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 2. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack from a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In RAI 3.5-12, the staff requested the information about the boric acid corrosion program on galvanized steel electrical conduit and cable trays. Table 3.5.2-25 of Unit 2 and Table 3.5.2-36 of Unit 3 list boric acid corrosion as an MP for galvanized steel electrical conduit and cable trays. The staff did not find that alvanized steel was included in the boric acid corrosion program as described in 2.1.3, and requested that the applicant address the discrepancy.

By letter dated November 9, 2004, the applicant stated the electrical conduit and cable trays listed in Unit 2 LRA Table 3.5.2-25 and Unit 3 LRA Table 3.5.2-36 are fabricated from carbon steel material that was galvanized for corrosion protection, and has been termed "galvanized steel" in the tables. Since no credit has been taken for the galvanized coating as described in LRA Appendix C, Section C2.4, the electrical conduit and cable trays loss of material aging effect due to boric acid corrosion is managed with the boric acid corrosion program. Accordingly, the applicant concluded that this material is in the category of materials termed "carbon and low alloy steel" in the boric acid corrosion program as described in B2.1.3.

The staff finds the applicant's response acceptable.

3.5A.2.3.26 Miscellaneous Structural Commodities - Aging Management Evaluation - Table 3.5.2-26

The staff reviewed Table 3.5.2-26 of the LRA, which summarized the results of AMR evaluations for the miscellaneous structural commodities component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for miscellaneous structural commodities.

In the LRA, the applicant stated that the GALL Report does not include silicone rubber for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structural commodities, that for silicone rubber in an air environment, irradiation and thermal exposure are aging mechanisms for change of material properties. The applicant stated that expansion joint/seismic gap material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads and temperatures greater than the threshold of 95°F. On the basis of its review of the applicant's document, the staff concurred with the applicant and finds that irradiation and thermal exposure are potential aging mechanisms for silicone rubber.

In the LRA, the applicant stated that change of material properties for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the structural condition, such as change in material properties. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation and thermal exposure of silicone rubber in an air environment.

In the LRA, the applicant stated that the GALL Report does not include silicone rubber for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment. The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for miscellaneous structural commodities, that for silicone rubber in an air environment, irradiation and thermal exposure are aging mechanisms for cracking. The applicant stated that expansion joint/seismic gap material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads and temperatures greater than the threshold of 95 °F. On the basis of its review of the applicant’s document, the staff concurred with the applicant and finds that irradiation and thermal exposure are potential aging mechanisms for silicone rubber.

In the LRA, the applicant stated that cracking for expansion joint/seismic gap material (between adjacent buildings/structures) component types in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. Structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the structural condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to irradiation and thermal exposure of silicone rubber in an air environment.

In the LRA, the applicant stated that the GALL Report does not include Pyrocrete for fire-resistant coatings component types in an air environment. The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for miscellaneous structural commodities, that for Pyrocrete in an air environment, irradiation is an aging mechanism for change of material properties. The applicant stated that fire-resistant coatings material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 rads. On the basis of its review of the applicant’s documentation, the staff concurred with the applicant and finds that irradiation is a potential aging mechanism for Pyrocrete.

In the LRA, the applicant stated that change of material properties for fire-resistant coatings in an air environment is managed by AMP B2.1.10, “Fire Protection Program,” with an exception. The staff reviewed the fire protection program and its evaluation is documented in Section

3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as change in material properties. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of Pyrocrete in an air environment.

In the LRA, the applicant stated that the GALL Report does not include Pyrocrete for fire-resistant coating component types in an air environment. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structural commodities, that for Pyrocrete in an air environment, differential movement, shrinkage, and vibration are aging mechanisms for cracking. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for Pyrocrete.

In the LRA, the applicant stated that cracking for fire-resistant coatings in an air environment is managed by AMP B2.1.10, "Fire Protection Program," with an exception. The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to differential movement, shrinkage, and vibration of Pyrocrete in an air environment.

In the LRA, the applicant stated that there are no aging effects for ceramic fire/EQ barrier penetration seals and concluded that no AMPs are required. The applicant stated that its AMR conclusion for the material is consistent with the GALL Report, which only calls for aging management of ceramic fire-barrier penetration seals that are exposed to an outdoor environment. On the basis of its review of the applicant's documentation and the fact that the ceramic materials are exposed only to indoor environments, the staff concurred with the applicant and finds that ceramic fire/EQ barrier penetration seals do not require aging management for the period of extended operation.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fire boot component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff concludes that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including cable tray cover and assembly; junction, terminal, and pull boxes; panels and cabinets; switchgear enclosures; and electrical component supports within cabinets and panels component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant stated that the GALL Report does not include marinite radiant energy shields component types in an air environment. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structural commodities, that for marinite radiant energy shields in an air environment, irradiation is a potential aging mechanism for change of material properties. The applicant stated that marinite radiant energy shields may be exposed to ionizing radiation values greater than the threshold radiation level of 10E6 rads. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that irradiation is a potential aging mechanism for marinite radiant energy shields.

In the LRA, the applicant stated that change of material properties for marinite radiant energy shields in an air environment is managed by AMP B2.1.10, "Fire Protection Program," with an exception. The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as change in material properties. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of marinite radiant energy shields in an air environment.

In the LRA, the applicant stated that the GALL Report does not include marinite radiant energy shields component types in an air environment. The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structural commodities, that for marinite radiant energy shields in an air environment, differential movement, shrinkage, and vibration as aging mechanisms for cracking. The applicant stated that marinite radiant energy shields are subject to cracking due to differential movement, shrinkage, and vibration. On the basis of its review of the applicant's documentation, the staff concurred with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for marinite radiant energy shields.

In the LRA, the applicant stated that cracking for marinite radiant energy shields in an air environment is managed by AMP B2.1.10, “Fire Protection Program,” with an exception. The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an acceptable exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire-rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to differential movement, shrinkage, and vibration of marinite radiant energy shields in an air environment.

In the LRA, the applicant stated that the GALL Report does not include cracking of rubber for flood prevention plugs component types in an air environment. The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for miscellaneous structural commodities, that for rubber in an air environment, thermal exposure is an aging mechanism for cracking. The applicant stated that rubber for flood prevention plugs may be exposed to temperatures greater than the threshold of 95 °F. On the basis of its review of the applicant’s documentation, the staff concurred with the applicant and finds that thermal exposure is a potential aging mechanism for rubber.

In the LRA, the applicant stated that cracking for rubber flood prevention plugs in an air environment is managed by AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to thermal exposure of rubber in an air environment.

The applicant stated, as documented in the staff’s MPS audit and review report for the AMR for miscellaneous structural commodities, that the MAER includes an evaluation of aluminum material in an air or an atmosphere/weather environment, and concluded that there are no potential aging mechanisms for these material/environment combinations. During the audit and review, the staff asked the applicant to explain why the evaluation is not in the MAER and the basis for its conclusions. The applicant stated to the staff that the MAER addresses aluminum material in an air or atmosphere/weather environment, and concluded that there are no potential aging mechanisms for these material/environment combinations at Unit 2. This conclusion is based on engineering test references, “Handbook of Corrosion Data,” and “Uhlig’s Corrosion Handbook.” The “Handbook of Corrosion Data” indicates that aluminum and its alloys resist attack by a wide range of environments and many chemical compounds. Consequently, aluminum is one of the metals most thought of by the public and engineering community when lower temperature corrosion resistance is considered. “Uhlig’s Corrosion Handbook” indicates that aluminum-based alloys as a class are highly resistant to normal outdoor exposure conditions. This conclusion in the MAER is also based on staff determinations, as presented in the SERs for other applicants' LRAs for plants that have environments, particularly outdoor environments, similar to MPS. Further, this conclusion is also supported by a review of Unit 2 plant-specific operating experience, which identifies no instances of loss of material for aluminum in an air or atmosphere/weather environment. The applicant stated to the staff that the conclusions in the LRA remain valid and unchanged. However, the applicant initiated a document modification request revise the MAER. Specifically, the MAER was revised to include the cited references in the aluminum/air and aluminum/atmosphere/weather sections. On the basis of its review, the staff finds the applicant's response to be acceptable.

The applicant stated, as documented in the staff's MPS audit and review report for the AMR for miscellaneous structural commodities that, for fire/EQ barrier penetration seals (including ceramic damming material) indicates N/A for the evaluation group. During the audit and review, the staff asked the applicant to explain how the ceramic damming material was evaluated for aging effects. The applicant stated to the staff that ceramic materials are similar to the glass and porcelain that are described in the MAER as having no aging effects. In its review, the staff finds that the applicant did not properly document this conclusion and the MAER does not specifically address ceramics. The applicant stated that the conclusions in the LRA remain valid and unchanged. However, the applicant initiated document modification request to revise the MAER to include ceramic along with glass and porcelain as having no aging effects that require evaluation for any application or environment to which it is exposed. In addition, the applicant initiated document modification requests to revise the AMR for miscellaneous structural commodities to indicate, in Section 4.0, that the MAER indicates no potential aging effects and no aging management required for ceramics. Therefore, the AMR does not evaluate aging mechanisms for the ceramic blanket or ceramic board in an air environment. On the basis of its review, the staff finds the applicant's response to be acceptable.

3.5A.2.3.27 Load Handling Cranes and Devices - Aging Management Evaluation - Table 3.5.2-27

The staff reviewed Table 3.5.2-27 of the LRA, which summarized the results of AMR evaluations for the load handling cranes and devices component groups. The staff interviewed the applicant's technical staff and reviewed the AMR technical justification for load handling cranes and devices.

In LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer machine and tilting mechanism support members (structural frame, tracks, and anchorage) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff concluded that there are no aging effects requiring management for metal in an air environment.

3.5A.2.3.28 Unit 2 Condensate Polishing Service Water Strainer House, Unit 2 Hydrogen Cylinder Storage Area, Unit 2 Sodium Hypochlorite Building

In its LRA supplement dated December 3, 2004, the applicant stated that changes of material properties in the structural reinforced concrete in an air or atmosphere/weather is managed by the AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects of changes of material properties for the above component.

In the LRA supplement dated December 3, 2004, the applicant also stated that cracking of the concrete masonry block walls in atmosphere/weather environment is is managed by AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems, and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in condition, such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects of cracking for the above component.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the containment, structures and component supports systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they are adequately describe the AMPs credited for managing aging of the containment, structures and component supports systems, as required by 10 CFR 54.21(d).

3.5B Unit 3 Aging Management of Containment, Structures and Component Supports

This section of the SER documents the staff's review of the applicant's AMR results for the containment, structures and component supports associated with the following structures:

- containment
- structures and structural components
  - Unit 3 containment enclosure building
  - Unit 3 auxiliary building
  - Unit 3 control building
  - Unit 3 fuel building
  - railroad canopy
  - Unit 3 hydrogen recombiner building
  - Unit 3 engineered safety features building
  - Unit 3 main steam valve building
  - Unit 3 emergency generator enclosure and fuel oil tank vault
  - Unit 2 fire pump house
  - Unit 3 fire pump house
  - Unit 3 service building
  - Unit 3 turbine building
  - Unit 3 auxiliary boiler enclosure
  - Unit 3 technical support center
  - Unit 3 maintenance shop
  - Unit 3 Waste Disposal Building
  - SBO diesel generator enclosure and fuel oil tank vault
  - Unit 3 condensate polishing enclosure
  - Unit 2 condensate polishing facility and warehouse no. 5
  - security diesel generator enclosure
  - stack monitoring equipment building
  - millstone stack
  - switchyard control house
  - 345kV switchyard
  - Unit 3 circulating and service water pumphouse
  - Unit 3 west retaining wall
  - sea wall
  - Unit 3 circulating water discharge tunnel and discharge structure
  - Unit 3 recirculation tempering line
  - vacuum priming pumphouse
  - tank foundations
  - yard structures
- NSSS equipment supports
- general structural supports
- miscellaneous structural commodities
- load handling cranes and devices

3.5B.1 Summary of Technical Information in the Application

In LRA Section 3.5, the applicant provided AMR results for containment, structures and component supports components and component groups. In LRA Table 3.5.1, "Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the containment, structures and component supports components and component groups.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.5B.2 Staff Evaluation

The staff reviewed LRA Section 3.5 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the containment, structures and components supports system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff's audit evaluation are documented in the staff's MPS audit report and summarized in Section 3.5B.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. The staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.5.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluations are documented in the staff's MPS audit report and summarized in Section 3.5B.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit report and summarized in Section 3.5B.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.5B.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the containment, structures and components supports system components.

Table 3.5B-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.5 that are addressed in the GALL Report.

Table 3.5B-1 Staff Evaluation for Containment, Structures and Component Supports in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Common Components of All Types of PWR and BWR Containment				
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1-01)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6B.
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1-02)	Cracking due to cyclic loading; crack initiation and growth due to SCC	Containment inservice inspection (ISI) and Containment leak rate test		Not Consistent with GALL (See Section 3.5B.2.2.1)
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1-03)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1-04)	Loss of material due to corrosion	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Sections 3.0.3.2.11 and 3.5B.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1-05)	Loss of leak tightness in closed position due to mechanical wear of locks, hinges, and closure mechanisms	Containment leak rate test and Plant Technical Specifications	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Sections 3.0.3.2.11 and 3.5B.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Seal, gaskets, and moisture barriers (Item Number 3.5.1-06)	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16); Work control process (B2.1.25)	Not Consistent with GALL (See Sections 3.0.3.2.11 and 3.0.3.3.4)
PWR Concrete (Reinforced and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment				
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-07)	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.1)
Concrete elements: foundation (Item Number 3.5.1-08)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	Structures monitoring program (B2.1.23)	Consistent with GALL (See Section 3.5B.2.2.1)
Concrete elements: foundation (Item Number 3.5.1-09)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	Structures monitoring program (B2.1.23)	Consistent with GALL (See Section 3.5B.2.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-10)	Reduction of strength and modulus due to elevated temperature	Plant-specific		Not Applicable (See Section 3.5B.2.2.1)
Prestressed containment: tendons and anchorage components (Item Number 3.5.1-11)	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	Not Applicable. This TLAA is evaluated in Section 4.5.1.
Steel element: liner plate and containment shell (Item Number 3.5.1-12)	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.1)
Steel elements: protected by coating (Item Number 3.5.1-14)	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	Inservice inspection program: containment inspections (B2.1.16)	Not Consistent with GALL (See Section 3.5B.2.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Prestressed containment: tendons and anchorage components (Item Number 3.5.1-15)	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Not applicable, containment is not a prestressed structure. (See Section 3.5B.2.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1-16)	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	Inservice inspection program: containment inspections (B2.1.16)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.2.1)
Class I Structures				
All Groups except Group 6: accessible interior/exterior concrete steel components (Item Number 3.5.1-20)	All types of aging effects	Structures Monitoring	Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Section 3.5B.2.2.2)
Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation (Item Number 3.5.1-21)	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant-specific	Structures monitoring program (B2.1.23)	Consistent with GALL, which recommends further evaluation (See Section 3.5B.2.2.2)
Group 6: all accessible / inaccessible concrete, steel, and earthen components (Item Number 3.5.1-22)	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of water-control structures or FERC/US Army Corp of Engineers dam inspection and maintenance	Structures monitoring program (B2.1.23); Infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Sections 3.0.3.2.16 and 3.0.3.3.3)
Group 5: liners (Item Number 3.5.1-23)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Water chemistry and monitoring spent fuel pool water level	Chemistry control for primary systems program (B2.1.5)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)
Groups 1-3, 5, 6: all masonry block walls (Item Number 3.5.1-24)	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall	Structures monitoring program (B2.1.23)	Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Groups 1-3, 5, 7-9: foundation (Item Number 3.5.1-25)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring		Not Consistent with GALL (See Section 3.5B.2.2.1)
Groups 1-3, 5-9: foundation (Item Number 3.5.1-26)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring		Not Consistent with GALL (See Section 3.5B.2.2.1)
Groups 1-5: concrete (Item Number 3.5.1-27)	Reduction of strength and modulus due to elevated temperature	Plant-specific		Not Applicable (See Section 3.5B.2.2.1)
Component Supports				
Groups 7, 8: liners (Item Number 3.5.1-28)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Plant-specific	Work control process (B2.1.25)	Not Consistent with GALL (See Section 3.5B.2.2.2)
All Groups support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc. (Item Number 3.5.1-29)	Aging of component supports	Structures Monitoring	Structures monitoring program (B2.1.23); General condition monitoring (B2.1.13); Battery rack inspections (B2.1.1); infrequently accessed areas inspection program (B2.1.15)	Not Consistent with GALL (See Section 3.5B.2.2.3)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts and welds (Item Number 3.5.1-30)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3B, Metal Fatigue
All Groups: support members: anchor bolts and welds (Item Number 3.5.1-31)	Loss of material due to boric acid corrosion	Boric acid corrosion	Boric acid corrosion (B2.1.3); General condition monitoring (B2.1.13)	Not Consistent with GALL (See Sections 3.5B.2.3.35 and 3.5B.2.3.36)
Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolaters (Item Number 3.5.1-32)	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	Inservice inspection program: systems, components and supports (B2.1.18); Structures monitoring program (B2.1.23); General condition monitoring (B2.1.13)	Not Consistent with GALL, which recommends no further evaluation (See Section 3.5B.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Group B1.1: high strength low-alloy bolts (Item Number 3.5.1-33)	Crack initiation and growth due to SCC	Bolting integrity		Consistent with GALL (See Section 3.5B.2.3.35)

The staff's review of the MPS containment, structures and component supports and associated components followed one of several approaches. One approach, documented in Section 3.5B.2.1, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.5B.2.2, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.5B.2.3, involves the staff's review of the AMR results for components in the containment, structures and component supports that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the containment, structures and component supports components is documented in Section 3.0.3 of this SER.

3.5B.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Sections 3.5.2.1.1 through 3.5.2.1.38 of the LRA, the applicant identified the materials, environments, and aging effects requiring management. The applicant identified the following programs that manage the aging effects related to the containment, structures and component supports components:

- boric acid corrosion program
- chemistry control for primary systems program
- general condition monitoring program
- inservice inspection program: containment inspections
- structures monitoring program
- work control process program
- infrequently accessed areas inspection program
- inservice inspection program: systems, components and supports
- battery rack inspections
- fire protection program
- inspection activities: load handling cranes and devices

Staff Evaluation. In Tables 3.5.2-1 through 3.5.2-38 of the LRA, the applicant provided a summary of AMRs for the containment and containment internals, auxiliary building, turbine building and circulating and service water pumphouse,, yard structures, and structural commodities, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

3.5B.2.1.1 Aging of Component Supports

In LRA Table 3.5.2-37 (page 3-655), the applicant stated that change of material properties and cracking of rubber material for watertight door gaskets in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The applicant also referenced GALL Item III. Item B4.2-a which specifies GALL AMP XI.S6, “Structures Monitoring Program” to manage these aging effects. The staff noted that Note E was used and that the component listed in the GALL Report is for vibration isolation elements while the component listed in the LRA table is a watertight door gasket. During the audit and review, the staff asked the applicant to explain why Note E was used instead of Note C.

In an LRA supplement dated July 7, 2004, the applicant stated that Note E should be Note C for the rubber material of the watertight door gasket structural member. In addition, the applicant made the same correction in the Unit 3 technical report for miscellaneous structural commodities. On the basis of its review, the staff finds the applicant’s response acceptable.

In LRA Table 3.5.2-25 (page 3-535), the applicant stated that loss of material of carbon steel and low-alloy steel for structural support components in an air or atmosphere/weather environment is managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Program,” MPS AMP B2.1.23, “Structures Monitoring Program,” and MPS AMP B2.1.13, “General Condition Monitoring” and GALL Item III.B2.1-a is matched. During the audit and review, the staff asked the applicant to explain why Note E was used for the infrequently accessed areas inspection program, Note A used for the structures monitoring program, and Note C was used for the general condition monitoring program. The applicant stated in that the Note C was incorrectly applied to these general condition monitoring line items and includes similar line items in LRA Table 3.5.2-36. Note A should have been applied since the general condition monitoring program performs the same inspections of structural supports as the structures monitoring program and is considered equivalent to GALL AMP XI.S6, “Structures Monitoring Program.” MPS AMP B2.1.23 is used to manage aging of non-ASME class, large equipment supports; and MPS AMP B2.1.13 is used to manage aging of other non-ASME class supports.

In an LRA supplement dated July 7, 2004, the applicant stated that Note C should be Note A for the general condition monitoring line items in Unit 3 Table 3.5.2-36 (pages 3-643 through 3-648) since the general condition monitoring program performs the same inspections of structural supports for the structures monitoring program and is considered equivalent to GALL AMP XI.S6, “Structures Monitoring Program.”

On the basis of its review of the applicant response, the staff finds the response acceptable.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.5.1 (Table 1), the applicant’s reference to the GALL Report are acceptable, that the line items are consistent with GALL, and no further staff review is required.

Staff RAIs Pertaining to Recent Operating Experience and Emerging Issues. Because the GALL Report and SRP-LR were issued in July 2001, these documents do not reflect the most current recommendations for managing certain aging effects that have been the subject of recent operating experience or the topic of an emerging issue. As a result, the staff issued RAIs to determine how the applicant proposed to address these items for license renewal.

In RAI 3.5-5, the staff requested information about the members of structures other than containments that uses the structures monitoring program as an AMP. Under column "Structural Member" in Table 3.5.2-x, structures and component supports, structures monitoring program was listed as an AMP for many structural members, such as doors, sliding bearings, metal siding sealants, roofing, siding, scuppers, miscellaneous steel, expansion joint/seismic gap material, and flood door/gate gasket. Item 18 in Table A6.0-1, License Renewal Commitments, stated, "The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures." The staff assumed that the words "in-scope structures" included all structural members listed in Table 3.5.2-x that use the structures monitoring program as an AMP. The staff requested that the applicant confirm whether the staff's assumption is correct.

By letter dated November 9, 2004, the applicant stated that this assumption is correct. Any in scope structural members that are not currently in the structures monitoring program, such as those listed above, but are required to be inspected, will be added to the program prior to the period of extended operation.

The staff finds the applicant's response acceptable.

In RAI 3.5-11, the staff requested the applicant to discuss whether Millstone Units 2 or 3 had piping and component supports that are anchored to concrete by using bolts with yield strength greater than 150 ksi. If yes, the applicant was requested to identify the AMP for those bolts and provide basis for the selection of the AMP if bolting integrity program is not selected.

By letter dated November 9, 2004, the applicant stated that no piping or component supports in Millstone Unit 2 or 3 have been identified as being anchored to concrete using anchor bolts with specified yield strengths greater than 150 ksi.

The staff finds the applicant's response acceptable.

As a result of issues raised during the scoping and screening methodology audit (discussed in Section 2.1.3.1), the staff requested additional information concerning newly in-scope structures. The following is a discussion of the applicant's responses and the staff evaluations.

In response to RAI 2.4-7 (Unit 2) and RAI 2.4-11 (Unit 3), the applicant stated that the post-tensioned anchorage system for the sea walls is in scope and the AMR result concluded that there are no aging effects requiring management. The staff reviewed the anchorage detail, as shown in FSAR Figure 2.5-15, and found that there is sufficient concrete surrounding the post-tensioned anchorage system to protect it from the environment and, therefore, concurs with the applicant's conclusion.

In response to RAI 2.4-3, the applicant added thermal insulation around high temperature piping containment penetrations to the scope of license renewal. The applicant's AMR result concluded that there are no aging effects for the fiberglass, asbestos, and calcium silicate piping penetration thermal insulation. However, the applicant stated that the localized concrete temperature in the vicinity of high energy piping containment penetrations is maintained below the threshold value by the containment penetration cooling system, which consists of a ventilation system in Unit 2 (the containment penetration cooling system described in LRA Section 2.3.3.18) and a water cooling system in Unit 3 (as part of the reactor plant component cooling system described in LRA Section 2.3.3.6). Since the concrete temperature around the containment penetration is properly maintained, the staff considers the applicant's proposal acceptable.

In response to RAI 2.4-5, the applicant added the sealant and the penetration seals component types to the scope of license renewal, and stated that they will be monitored by containment Inspection AMP as modified by the response to RAI 3.5-1 provided in Dominion letter SN 04-674, dated November 9, 2004. The staff accepts the AMP as discussed in Section 3.5B.2.3.1 of this SER.

In response to RAI 2.4-13, the applicant stated that the groundwater underdrains storage tank and associated piping have bee added to the scope of license renewal. The staff evaluation is documented in Section 2.4B.1.2 of this SER.

In response to RAI 2.4-14, the applicant stated that rock dowels and rock anchors are in scope and are included in the structural member "Structural Reinforced Concrete" in LRA Tables 2.4.2-2, 2.4.2-12, and 2.4.2-13 and subject to aging management. The applicant was requested to identify the (1) the difference between rock dowels and rock anchors, and (2) the respective AMR/AMP sections in the LRA, if they were already included, or provide the AMR/AMP if they did not exist.

The applicant stated in its January 11, 2005 response that the rock dowels were designed as a passive support system (not pre-stressed). The rock anchors were stressed and locked off at a permanent load (pre-stressed) during installation. The rock dowels and rock anchors are not uniquely identified in the license renewal application, but are considered to be embedded steel in concrete, similar to reinforcing steel, plates, and anchor bolts, as described in LRA Section C3.3.3 "Corrosion of Embedded Steel – Concrete. The rock dowels and rock anchors are included with the structural reinforced concrete structural member in the aging management review results tables for the applicable structures. Rock dowels are part of the Auxiliary Building foundation mat slab and the aging management review results are provided in LRA Table 3.5.2-3 as structural reinforced concrete in a soil environment. Rock anchors are part of the foundation mat slab for the Service Building and part of the footing and grade beams for the Turbine Building and the aging management review results are provided in LRA Tables 3.5.2-13 and 3.5.2-14 as structural reinforced concrete in a soil environment.

The staff accepts the applicant's clarification.

On the basis of its audit and review, the staff determined that for AMRs not requiring further evaluation, as identified in LRA Table 3.5.1 (Table 1), the applicant's references to the GALL Report are acceptable, that the line items are consistent with GALL, and no further staff review is required.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL

Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In Section 3.5.2.2 of the LRA, the applicant provided further evaluation of aging management as recommended by the GALL Report for containment, structures and component supports. The applicant provided information concerning how it will manage the following aging effects:

- aging of inaccessible concrete areas
- cracking, distortion, and increase in component stress level due to settlement; reduction of foundation strength due to erosion of porous concrete subfoundations, if not covered by structures monitoring program
- reduction of strength and modulus of concrete structures due to elevated temperature
- loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate
- loss of prestress due to relaxation, shrinkage, creep, and elevated temperature
- cumulative fatigue damage
- cracking due to cyclic loading and SCC
- aging of structures not covered by structures monitoring program
- aging management of inaccessible areas
- aging of supports not covered by structures monitoring program
- cumulative fatigue damage due to cyclic loading

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant's evaluation to determine whether it adequately addressed the issues that were further evaluated. In addition, the staff audited the applicant's further evaluations against the criteria contained in Section 3.5.2.2 of the Standard Review Plan for License Renewal. Details of the staff's audit review are documented in the staff's MPS audit and review report.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.5B.2.2.1 PWR Containments

The staff reviewed LRA Section 3.5.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.1, which addresses several areas discussed below.

Aging of Inaccessible Concrete Areas. The staff reviewed LRA Section 3.5.2.2.1.1 against the criteria in SRP-LR Section 3.5.2.2.1.1. In LRA Section 3.5.2.2.1.1, the applicant addressed aging of inaccessible concrete areas for the Unit 3 containment.

For inaccessible portions of the containment structure, 10 CFR 50.55a(b)(2)(ix) requires that the applicant evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to inaccessible areas.

The AMP recommended by the GALL Report for managing the aging of the accessible portions of the containment structures is GALL AMP XI.S2, “ASME Section XI, Subsection IWL.” The applicant addressed this with MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” The staff reviewed the inservice inspection program: containment inspections and its evaluation is documented in Section 3.0.3.2.11 of this SER. Subsection IWL exempts from examination those portions of the concrete containment that are inaccessible (e.g., foundation, below-grade exterior walls, or concrete covered by liner).

The applicant also used MPS AMP B2.1.23, “Structures Monitoring Program” where accessible areas are monitored for evidence of aging effects that may be applicable to containment structures. This program, which is consistent with GALL AMP XI.S6, “Structures Monitoring Program,” with enhancements, was reviewed by the staff and its evaluation is documented Section 3.0.3.2.16 of this SER. The applicant also credited the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

In the GALL Report, Volume 2, Chapter II, Table A1 (as modified by ISG-3), further evaluation is recommended to manage the aging effects for containment concrete components located in inaccessible areas if the aging mechanisms of (1) freeze-thaw, (2) leaching of calcium hydroxide, (3) aggressive chemical attack, (4) reaction with aggregates, or (5) corrosion of embedded steel are significant. Possible aging effects for containment concrete structural components due to these five aging mechanisms are cracking, change in material properties, and loss of material.

(1) Freeze-thaw - SRP-LR Section 3.5.2.2.1.1 does not address freeze-thaw as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3, “Chapters II and III fo GALL Report on Aging Management of Concrete Elements,” clarifies the staff position that further evaluation is appropriate if the applicant’s facility is subject to moderate to severe weathering conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

    Unit 3 is located in a region considered to be subject to severe weather conditions. In the LRA, the applicant stated that Unit 3 concrete structures are designed in accordance with specification ACI 318-63, “Building Code Requirements for Reinforced Concrete,” which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

    - high cement content
    - low water-to-cement ratio
    - proper curing
    - adequate air entrainment

In addition to ACI 318-63, the applicant stated that Unit 3 concrete also meets the criteria of guidelines ACI 201.2R-77, “Guide to Durable Concrete.” ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application, and testing of concrete.

The Unit 3 containment structure is protected from precipitation by an enclosure building which also prevents potential freeze-thaw action. During the audit and review, the staff interviewed members of the applicant’s technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed, either through the inservice inspection - IWL program or the structures monitoring program.

On the basis of its review, the staff finds that loss of material and cracking due to freeze-thaw will be adequately managed by the containment inservice inspection program because: (1) that concrete that satisfies the requirements of ACI 318-63 will meet the requirements of ISG-3, (2) an audit of operating experience evaluated under the inservice inspection program: containment inspections and structures monitoring programs, and (3) the containment structure is protected from the elements by an enclosure structure.

(2) Leaching of calcium hydroxide - SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report, as updated by ISG-3, recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria cannot be satisfied.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the LRA, the applicant stated that Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the criteria of guideline ACI 201.2R-77.

The staff finds that because ACI 318 and ACI 201.2R-77 provides assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at Unit 3. The staff therefore concludes that the inservice inspection program: containment inspections program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific AMP is not required to address this aging effect.

(3) Aggressive chemical attack - SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH is less than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the staff noted that the applicant used the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

On the basis of the information provided in the LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the staff finds that increases in porosity and permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack are not significant for concrete in Unit 3 containment inaccessible areas. The applicant used MPS AMP B2.1.23, “Structures Monitoring Program” to test the ground water on a periodic basis, considering seasonal variations to ensure the aging mechanism of aggressive chemical attack does not become significant in the future and also to examine below-grade concrete when it is exposed by excavation. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff finds that the structures monitoring program is an appropriate program for examination of below-grade concrete when it becomes accessible.

(4) Reaction with aggregates - SRP-LR Section 3.5.2.2.1.1 does not address reaction with aggregates as an aging mechanism for concrete containments because no further evaluation is recommended in the GALL Report. However, ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the LRA, the applicant stated that Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the criteria of guideline ACI 201.2R-77. The ACI standards call for the testing of aggregates at the time of construction.

On the basis of interviews with the applicant’s technical staff, the staff confirmed that the results of those tests show that the aggregates used for the Unit 3 concrete containment at MPS are not reactive. The staff finds that this aging effect does not require management at MPS. However, the applicant stated, in the LRA, that it will manage change of material properties as a potential aging effect on concrete structures. In the LRA, the applicant stated that change of material properties for the Unit 3 containment due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections” and MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed these programs and its evaluation is documented in Sections 3.0.3.2.11 and 3.0.3.2.16 of this SER, respectively.

(5) Corrosion of embedded steel - SRP-LR Section 3.5.2.2.1.1 states that loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

For cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only recommended if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is recommended to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH greater than 5.5, chlorides less than 500 ppm, and sulfates less than 1,500 ppm). The staff noted that the applicant credited the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation. In addition, the applicant committed, in its structures monitoring program, to periodically monitor below-grade chemistry to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.

The staff finds that, in accordance with the criteria of the GALL Report, this aging effect is not significant and is adequately managed.

The staff reviewed the results of the applicant's AMR for inaccessible concrete areas. On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of aging of inaccessible concrete areas for containment, as recommended in the GALL Report and ISG-3. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program. The staff reviewed LRA Section 3.5.2.2.1.2 against the criteria in SRP-LR Section 3.5.2.2.1.2.

In LRA Section 3.5.2.2.1.2, the applicant addressed (1) cracking, distortion and increase in component stress level due to settlement and (2) reduction of foundation strength due to erosion of porous concrete subfoundations in the containment.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 3. The applicant also stated that Unit 3 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. A porous concrete subfoundation is installed beneath the reinforced concrete foundation mat for Unit 3 containment and a portion of the ESF building to control groundwater seepage through or around the waterproof membrane. Breaches in the waterproof membrane around the Unit 3 containment have been identified, which has resulted in water seepage through the membrane and the porous concrete subfoundation. Aging effects associated with porous concrete subfoundation degradation and the resulting potential for settlement of Unit 3 containment are managed by MPS AMP B2.1.23, “Structures Monitoring Program.” An installed de-watering system removes water that seeps through the membrane. Most of the ESF building is founded on bedrock and only a small portion of the ESF building is founded on a porous concrete subfoundation that is placed on the bedrock. Therefore, cracking due to settlement is not a concern associated with the ESF building. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed the AMR results involving management of aging effects resulting from settling and erosion of porous concrete subfoundations and confirmed that the structures monitoring program addressed each of the affected structures and components.

In RAI 3.5-3, the staff requested information regarding the erosion of high-alumina cement from the porous concrete sub-foundation as follows:

> In item number 3.5.1-08, the applicant asserts that settlement is not expected to occur during the period of extended operation. Further evaluation provided in Subsection 3.5.2.2.1.2 indicates that the containment and part of the engineering safety feature building foundation mats are sitting on porous concrete foundation. During years 1996-1997, it was revealed that drainage water through the porous foundation consisted of significant amount of high alumina cement, and that the applicant was monitoring depletion of cement and settlement of the affected structures (see NRC Info Notice 97-11). The applicant was requested to provide a summary of the quantitative assessment of the depletion of cement and its affects on the settlement of the structures during the period of extended operation. Also, the applicant was requested to justify why this item should not require a TLAA.

By letter dated December 3, 2004, the applicant stated:

> Settlement of the Millstone Unit 3 containment structure is not considered a TLAA. This analysis does not involve time-limited assumptions since even assuming the worst case situation represented by a complete loss of all concrete in the porous concrete subfoundation, the resultant change in frequency characteristics are within the uncertainty range allowed for the peak broadened spectra used in the design of the containment structure (M. H. Brothers to NRC, Millstone Power Station Unit No. 3 – Response to Request for Additional Information on Erosion of Cement from the Underlying Porous Concrete Drainage System, Millstone Unit No. 3, Letter B16403 dated April 30, 1997).
>
> Millstone Unit 3 has performed extensive analysis of the condition of the porous concrete subfoundation, including the effect of cement erosion, the potential loss of strength of the

subfoundation due to conversion of the high alumina cement, the effect of cement erosion on the load bearing capacity of the porous concrete, and the functional integrity of the containment structure (J. A. Price to NRC, Millstone Power Station Unit No. 3 License Renewal – Request for Exemption From the Requirements of 10 CFR 54.17(c), Response to Request for Additional Information, Letter B18948 dated September 3, 2003). The mass loss of high alumina (calcium-alumina) residue discharged into the ESF sumps has been monitored since the startup of Millstone Unit 3 in 1986. A commitment (captured in the structures monitoring program) to continue this periodic monitoring was made as a means of insuring that no new or adverse changes are occurring in the porous concrete subfoundation (M. L. Bowling to NRC, Millstone Nuclear Power Station Unit 3, Response to Request for Additional Information – Erosion of Cement From the Underlying Porous Concrete Drainage System, Letter B17115 dated April 16, 1998). ESF sump sample results can be found in Table 1. These results are conservatively projected to year 2026 (480 months) in Figure 1. The 480 months represents the current 40-year license x 12 months/year. By 2026 approximately 3,600 pounds (or 0.5%) of the 670,000 pounds of calcium-alumina cement in the porous media could be lost. This loss is not expected to adversely affect the function of the porous media (NRC to M. L. Bowling, NRC Combined Inspection 50-245/98-208; 50-336/98-208; 50-423/98-208 and Notice of Violation, Letter A13866 dated August 12, 1998).

As a result of a follow-up question related to the cumulative effect of the erosion and its effects on the settlement of the Millstone 3 containment structure, the applicant provided a detailed summary of the analyses and inspections it had performed, and commitments it has made to NRC. The essential items of the commitments (Table 2) as applicable during the period of extended operation are as follows:

Table 2 Millstone Unit 3 - Containment Basemat Commitments Made in Previous Correspondence

Number	Commitment	Status
B17115-01	Monitoring of the HAC porous concrete and portland cement porous concrete groundwater chemistry to confirm the subcontainment chemical and environmental conditions	Yearly
B17115-02	Measuring of the white residue/mass-loss of calcium-alumina in the ESF sumps	Semi-annually
B17115-03	Inspection of the sub-containment drainage piping in the ESF sumps	Yearly
B17115-04	Containment structure settlement monitoring	External surveys every 2 years; internal ISI every 3 years

Based on the trend line drawn by the applicant, the cumulative projected loss of high alumina cement is about half a percent of the calcium alumina cement in porous media by the year 2026. Based on the review of a number of analyses (including seismic analysis) performed by the applicant during CLB, the staff agrees with the applicant's assertion that containment will perform its intended function during the period of extended operation. The staff believes that this item is a candidate for a TLAA. However, based on the commitments made by the applicant to monitor the magnitude of erosion of the porous concrete from the subfoundation and monitoring the containment structures for signs of differential settlement, the staff finds the applicant's program for managing the erosion of the containment subfoundation acceptable.

On the basis of this review, the staff concludes that the applicant has appropriately evaluated AMR results involving cracking, distortion, and increase in component stress level from settlement and reduction of foundation strength from erosion, as recommended in the GALL Report.

The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature. In LRA Section 3.5.2.2.1.3, the applicant addressed reduction of strength and modulus of concrete structures due to elevated temperature in containments.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits (i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F)).

In LRA Section 3.5.2.2.1.3, the applicant stated that during normal operation, all areas within the containment building do not experience elevated temperatures greater than 150 °F general and greater than 200 °F local. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 3 containment concrete.

On the basis of its review, the staff concurs with the applicant and concludes that change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 3 containment concrete.

Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate. The staff reviewed LRA Section 3.5.2.2.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4.

In LRA Section 3.5.2.2.1.4, the applicant addressed loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate for the containment.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if the following specific criteria defined in the GALL Report cannot be satisfied: (1) concrete meeting the guidelines of ACI 318 or ACI 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner; (2) the accessible concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner; (3) the accessible portion of the moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements; (4) borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

In the LRA, the applicant stated that the containment concrete in contact with the steel liner plate is designed in accordance with ACI 318-63, and meets the guideline ACI 201.2R-77. Accessible concrete of the containment structure is monitored for penetrating cracks under MPS AMP B2.1.16, “Inservice Inspection Program: Containment Inspections.” The staff reviewed the inservice inspection program: containment inspections program, with exceptions, and its evaluation is documented in Section 3.0.3.2.11 of this SER. In addition, the applicant stated, in the LRA, that the accessible portions of the steel liner plate and moisture barrier where the liner becomes embedded are inspected in accordance with MPS AMP B2.1.16, “Inservice Inspection

Program: Containment Inspections." Spills (e.g., borated water spill) are cleaned up in a timely manner. The aging effect of loss of material due to corrosion has not been significant for Unit 3 liner plate.

On the basis of its review, the staff finds that all of the criteria identified in the GALL Report are satisfied. The staff finds that no additional, plant-specific AMP is required to manage inaccessible areas of the steel containment liner plate.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving loss of material due to corrosion in inaccessible areas of the steel containment shell or the steel liner plate, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature</u>. In LRA Section 3.5.2.2.1.5, the applicant stated that the Unit 3 containment is not a prestressed structure therefore, this item is not applicable.

The staff concurs with the applicant and finds that this aging effect is not applicable to MPS Unit 3.

<u>Cumulative Fatigue Damage</u>. As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.6 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.6 of the SRP-LR.

<u>Cracking Due to Cyclic Loading and Stress Corrosion Cracking</u>. The staff reviewed LRA Section 3.5.2.2.1.7 against the criteria in SRP-LR Section 3.5.2.2.1.7.

In LRA Section 3.5.2.2.1.7, the applicant addressed aging mechanisms that can lead to cracking of penetration sleeves and penetration bellows such as cyclic loads and SCC.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in containments. Further evaluation of inspection methods is recommended to detect cracking due to cyclic loading and SCC since visual VT-3 examinations may be unable to detect this aging effect.

In LRA Section 3.5.2.2.1.7, the applicant stated that stress corrosion cracking is applicable to carbon and low-alloy steel in air only if the fabrication material is high yield strength steel. SCC of stainless steel in air is only applicable to sensitized stainless steel that is exposed to intermittent wetting. Unit 3 containment penetrations, including penetration sleeves, bellows, and dissimilar metal welds, are not fabricated form high yield strength steel and the stainless steel materials are not subject to intermittent wetting. Therefore, cracking due to SCC does not require aging management for the Unit 3 containment.

The staff reviewed and concurs with the applicant that cracking due to SCC is not an applicable aging effect for MPS, and augmented inspection to detect cracking is not necessary.

In RAI 3.5-2, the staff requested information about the containment pressure boundary bellows as follows:

> In discussing item number 3.5.1-03 (Table 3.5.1) of the LRA, the applicant asserted that the Millstone AMR results are consistent with NUREG-1801. NUREG-1801 under item A3.1 (page II A3.6) recommends further evaluation regarding the stress corrosion cracking of containment bellows. Table 3.5.2, under “Expansion Bellows” makes reference to the Table items 3.2.1-05 and 3.2.1-06. However, they did not address the expansion bellows associated with the containment pressure boundary. Normally, applicants take credit for properly designed Type B tests to ensure the leak tight behavior of the bellows. However, in AMP B2.1.6, the applicant does not take credit for Type B testing. The applicant was requested to provide additional information regarding the containment pressure boundary bellows at Millstone 2 and 3, relevant operating experience, and method(s) used to detect their age related degradation.

By letter dated December 3, 2004, the applicant provided the following response:

> As identified in the response to RAI 3.5-1, Dominion will credit Local Leak Rate Tests in accordance with 10 CFR 50 Appendix J requirements for Type B penetrations. Both Millstone Units 2 and 3 have bellows type penetrations associated with the design of their respective fuel transfer tubes. These are the only examples of bellows type penetrations for either unit. The Millstone Unit 2 bellows type penetration does not form any portion of the Containment pressure boundary, and therefore, does not require leak rate testing in accordance with Appendix J requirements. Millstone Unit 3 includes the bellows type penetration for the fuel transfer tube in its Appendix J program as a Type B containment penetration. In accordance with Appendix J requirements, each time a Type B penetration has been opened, it must have a Type B test performed after closure to reestablish the containment boundary integrity. As such, this bellows type penetration is Local Leak Rate Tested during each refueling outage after completion of refueling activities and after the penetration flange has been reinstalled and verified as leak tight to establish the containment boundary.

The staff finds the response to RAI 3.5-2 acceptable, as the leak rate testing provisions will adequately ensure the integrity of the Millstone 3 containment penetration bellows.

Cracking due to cyclic loading of the liner plate and penetrations is a TLAA which is evaluated and addressed in Section 4.6 of this SER.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of cracking due to SCC for containment components, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2.2 Class 1 Structures.

The staff reviewed LRA Section 3.5.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2, which addresses several areas discussed below.

Aging of Structures Not Covered by Structures Monitoring Program. The staff reviewed LRA Section 3.5.2.2.2.1 against the criteria in SRP-LR Section 3.5.2.2.2.1. In LRA Section 3.5.2.2.2.1, the applicant addressed aging of Class 1 structures not covered by the structures monitoring program.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structures monitoring program. This is described in GALL Report Chapter III and includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, and 5, and 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5 and 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5 and 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5 and 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5,and 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundations for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5 and 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

Also, technical details of the aging management issue are presented in SRP-LR Subsection 3.5.2.2.1.2 for structure/aging effect combinations Items (5) and (6) and SRP-LR Subsection 3.5.2.2.1.3 for Item (8), above.

In LRA Table 3.5.1, Item 3.5.1-20 (page 3-502), the applicant credits MPS AMP B2.1.23, “Structures Monitoring Program” for all types of aging effects and all component groups except Group 6 of accessible interior and exterior concrete and steel components of Class 1 structures. The staff reviewed the structure monitoring program and its evaluation is documented Section 3.0.3.2.16 of this SER. Additional discussion of specific structure/aging effect combinations follows.

(1) Freeze-thaw - SRP-LR Section 3.5.2.2.2.1 addresses freeze-thaw as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if the applicant’s facility is subject to moderate to severe weathering conditions unless the concrete meets certain specifications and subsequent inspections have confirmed that the aging mechanism has not caused degradation of the concrete.

    Unit 3 is located in a region considered to be subject to severe weather conditions. In the LRA, the applicant stated that Unit 3 structures are designed in accordance with specification ACI 318-63, which results in low permeability and resistance to aggressive chemical solutions by requiring the following:

- high cement content
- low water-to-cement ratio
- proper curing
- adequate air entrainment

In addition to ACI 318-63, the applicant stated that Unit 3 concrete also meets criteria of the guideline of ACI 201.2R-77. ACI 318-63 and ACI 201.2R-77 use the same ASTM standards for selection, application and testing of concrete.

The staff interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that loss of material from freeze-thaw has not been observed through MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

On the basis that concrete that satisfies the criteria of ACI 318-63 will meet the guidelines of ISG-3, and on the basis of an audit of operating experience evaluated under the structures monitoring program, the staff finds that loss of material and cracking due to freeze-thaw will be adequately managed by the structures monitoring program.

(2a) Leach's of calcium hydroxide - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide could occur in Class 1 structures. The GALL Report recommends a plant-specific AMP for inaccessible areas, unless the criteria of ACI 201.2R-77 for Class 1 structural concrete are met.

The GALL Report states that leaching of calcium hydroxide becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled.

In the LRA, the applicant stated that Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meet the criteria of guideline ACI 201.2R-77.

The staff finds that because ACI 318 provides assurance that the criteria of the GALL Report and ISG-3 are met, leaching of calcium hydroxide is not significant at Unit 3, and therefore concludes that the structures monitoring program will be sufficient for management of increases in porosity and permeability from this aging mechanism. A plant-specific AMP is not required to address this aging effect.

(2b) Aggressive chemical attack - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack could occur in inaccessible areas of Class 1 structures. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report and updated in ISG-3 cannot be satisfied.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In the LRA, the applicant stated that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). In addition, the staff noted that the applicant used the structures monitoring program for the examination of below-grade concrete when it is exposed by excavation.

On the basis of its review of the information provided in the LRA and the guidelines provided in the SRP-LR, the GALL Report, and ISG-3, the staff finds that increases in porosity and permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack are not significant for concrete in inaccessible areas. The staff finds that an appropriate AMP for examination of below-grade concrete (specifically, an enhancement to the structures monitoring program) has been identified.

(3) Reaction with aggregates - SRP-LR Section 3.5.2.2.2.1 addresses reaction with aggregates as an aging mechanism for Class 1 structures. ISG-3 clarifies the staff position that further evaluation is appropriate if investigations, tests, or examinations have demonstrated that the aggregates are reactive.

In the LRA, the applicant stated that Unit 3 concrete structures are designed in accordance with specification ACI 318-63 and meets the requirements of guideline ACI 201.2R-77. The ACI standards call for the testing of aggregates at the time of construction.

On the basis of interviews with the applicant's technical staff, the staff confirmed that the results of those tests showed that the aggregates used for concrete Class 1 structures at Unit 3 are not reactive. However, the applicant stated that it will manage cracking as a potential aging effect on concrete structures. In the LRA, the applicant stated that change of material properties and cracking due to alkali (cement)-aggregate reaction of concrete in various environments is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

(4) Corrosion of embedded steel - SRP-LR Section 3.5.2.2.2.1 states that cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of Class 1 structures. The GALL Report (updated in ISG-3) recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL Report cannot be satisfied.

Also, for cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel, the GALL Report states that a plant-specific program is only recommended if the below-grade environment is aggressive. ISG-3 also states that a plant-specific program is recommended to examine representative samples of below-grade concrete when excavated for any reason.

The staff finds that, in accordance with the criteria of the GALL Report, these aging effects are not significant and are adequately managed by MPS AMP B2.1.23 "Structures

Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also finds an enhancement to the structures monitoring program for examination of below-grade concrete to be acceptable.

(5) Settlement - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for discussion of settlement. SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in Class 1 structures. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 3 for Class 1 structures. The applicant stated that Unit 3 Class 1 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. Also, no Class 1 structures utilize porous concrete subfoundations, other than a portion of the ESF building, which is on bedrock. In addition, the applicant stated that Unit 3 has a dewatering system under some Class 1 structures which is monitored by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

On the basis of its review, the staff concludes that foundation settlement is not an aging mechanism at Unit 3.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of settlement, as recommended in the GALL Report. Since the applicant's AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(6) Erosion of porous concrete subfoundation - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.2 for discussion of erosion of porous concrete subfoundation. SRP-LR Section 3.5.2.2.1.2 states that reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of Class 1 structures. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

The applicant stated, in the LRA, that aging effects (cracking, distortion, and increase in component stress level) due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations are not expected at Unit 3 for Class 1 structures. The applicant stated that Unit 3 Class 1 structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. No structures utilize porous concrete subfoundations, other than a portion of the ESF building, which is on bedrock. In addition, the applicant stated that Unit 3 has a dewatering system under some Class 1 structures which is monitored by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER.

Based on the fact that no Unit 3 structures utilize porous concrete subfoundations, other than a portion of the ESF building which is on bedrock and that Unit 3 has a dewatering system under some Class 1 structures, the staff concludes that foundation settlement is not an aging mechanism at Unit 3.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of erosion of porous concrete subfoundation, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

(7) Corrosion of structural steel components - The SRP-LR Section 3.5.2.2.2.1 states that corrosion of structural steel components for Groups 1-5 and 7-8 could occur and that further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

In LRA Section 3.5.2.2.2.1, the applicant stated that the aging effects associated with structures are managed by MPS AMP B2.1.23, “Structures Monitoring Program.” However, aging effects for infrequently accessed portions of the structure are managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program.”

The staff reviewed the AMR results involving management of aging effects resulting from corrosion of structural steel components and confirmed that MPS AMP B2.1.23, “Structures Monitoring Program” and MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program” address each of the affected Structures and components. The staff reviewed these programs and its evaluation of these programs is documented in Sections 3.0.3.2.16 and 3.0.3.3.3 of this SER, respectively.

On the basis of its audit and review, the staff finds that the applicant has appropriately evaluated AMR results involving this aging effect and that corrosion of structural steel components is adequately managed by the structures monitoring program and infrequently accessed area’s inspection program.

(8) Elevated temperatures - SRP-LR Section 3.5.2.2.2.1 refers to Section 3.5.2.2.1.3 for discussion of elevated temperatures. SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in Class 1 structures in Groups 1-5. The GALL Report calls for a plant-specific aging management program and recommends further evaluation if any portion of the concrete component exceeds specified temperature limits (i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F)).

In LRA Section 3.5.2.2.1.3, the applicant stated that during normal operation, all general concrete areas in Class 1 structures remain below 150 °F and local area temperatures remain below 200 °F. Therefore, change in material properties due to elevated temperature is an aging effect not requiring management for Unit 3 Class 1 structures.

On the basis of its review, the staff concurs with the applicant and concludes that change in material properties due to elevated temperature is an aging effect not requiring management for the Unit 3 Class 1 structures.

(9) Aging effects for stainless steel liners for tanks - The SRP-LR Section 3.5.2.2.2.1 states that crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures could occur and further evaluation is necessary only for structure/aging combinations not covered by the structures monitoring program.

In LRA Table 3.5.1, Item 3.5.1-28 (page 3-505), the applicant stated that there are no steel-lined concrete tanks at Unit 3 in GALL Structures Group 7, requiring aging management. The applicant also stated that all other tanks (steel tanks, Structures Group 8) are evaluated as part of the associated plant system. During the audit and review, the staff noted that, for sump liner of stainless steel material in LRA Table 3.5.2-5 (page 3-538) and Unit 3 Table 3.5.2-8 (page 3-549), the applicant references Item 3.5.1-28. It appears that the applicant does not evaluate all steel tanks as part of the associated plant system. During the audit, the staff asked the applicant to explain why further evaluation is not provided.

The applicant responded that the Unit 3 Table 3.5.2-5 and Unit 3 Table 3.5.2-8 for sump liner of stainless steel material roll up to LRA Table 3.5.1, Item 3.5.1-28; however, the discussion column only stated that there are no steel lined concrete tanks. The applicant stated that the discussion column should be revised to indicate that loss of material for stainless steel sump liners is managed by MPS AMP B2.1.25, "Work Control Process."

In an LRA supplement dated July 7, 2004, the applicant stated that LRA Table 3.5.1, Item 3.5.1-28, the "Discussion" column, should have included a statement that loss of material of steel lined concrete sumps is managed by the work control process program. In addition, a "further evaluation recommended discussion" should have been included in LRA Section 3.5.2.2 as follows:

There are no in-scope steel lined concrete tanks at MPS. Loss of material for steel lined concrete sumps is managed by the Work Control Process AMP.

The applicant initiated a document change to revise the Unit 3 technical report for SRP items recommended for further evaluation, to add a discussion in LRA Section 3.5.2.2.

On the basis of its review, the staff finds the applicant's response acceptable.

<u>Aging Management of Inaccessible Areas</u>. The staff reviewed LRA Section 3.5.2.2.2.2 against the criteria in SRP-LR Section 3.5.2.2.2.2.

In LRA Section 3.5.2.2.2.2, the applicant addressed aging of inaccessible areas of Class 1 structures.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects in inaccessible areas of Groups 1-3, 5, and 7-9 structures, if an aggressive below-grade environment exists. ISG-3 identifies additional guidance.

The GALL Report, as updated by ISG-3, states that aggressive chemical attack and corrosion of embedded steel is not significant unless pH is less than 5.5, chlorides are greater than 500 ppm, or sulfates are greater than 1,500 ppm. ISG-3 also states that a plant-specific program is required to examine representative samples of below-grade concrete when excavated for any reason.

In LRA Section 3.5.2.2.2.2, the applicant stated that the below-grade environment is not aggressive (pH is greater than 5.5, chlorides are less than 500 ppm, and sulfates are less than 1,500 ppm). The applicant stated in the LRA that it used the enhanced MPS AMP B2.1.23, “Structures Monitoring Program” to examine below-grade concrete when it is exposed by excavation. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 in this SER. The staff finds that the structures monitoring program, as enhanced, is an appropriate program for examination of below-grade concrete when it becomes accessible.

The applicant stated, in the LRA, that inspections of accessible concrete have not revealed degradation from aggressive chemical attack or corrosion of embedded steel.

On the basis that the below-grade environment is not aggressive with periodic groundwater monitoring considering seasonal variations and that excavated concrete has been and will continue to be monitored, the staff finds that increases in porosity and permeability, loss of material (spalling, scaling) and cracking due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are adequately managed for concrete in inaccessible areas.

On the basis of its audit and review, the staff finds that the applicant appropriately evaluated AMR results involving management of inaccessible areas, as recommended in the GALL Report. Since the applicant’s AMR results are otherwise consistent with the GALL Report, the staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2.3 Component Supports

The staff reviewed LRA Section 3.5.2.2.3 against the criteria in SRP-LR Section 3.5.2.2.3, which addresses two areas discussed below.

Aging of Supports Not Covered by Structures Monitoring Program. The staff reviewed LRA Section 3.5.2.2.3.1 against the criteria in SRP-LR Section 3.5.2.2.3.1.

In LRA Section 3.5.2.2.3.1, the applicant addressed aging of component supports that are not managed by the structures monitoring program.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

The applicant, in the LRA, has included the GALL Report AMP under the applicant's general MPS AMP B2.1.23, "Structures Monitoring Program." However, this program is not consistent with the GALL Report since the component groups are not completely within the scope of the applicant's structures monitoring program, thus requiring further evaluation. The applicant stated, in LRA Section 3.5.2.2.3.1, that the structures monitoring program only manages aging effects associated with large equipment supports. The applicant also stated that MPS AMP B2.1.13, "General Condition Monitoring" is used to manage aging effects for supports for other components and piping and MPS AMP B2.1.1, "Battery Rack Inspections," is used to manage age-related degradation specific to battery supports. The aging effects for supports in infrequently accessed areas are managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program." The staff reviewed these programs and its evaluation is documented in Sections 3.0.3.3.2, 3.0.3.3.1, and 3.0.3.3.3 in the SER, respectively. The staff finds the structures monitoring program acceptable, in conjunction with the other three programs, for managing aging of component supports for all GALL Report component support groups.

Cumulative Fatigue Damage Due to Cyclic Loading. As stated in the SRP-LR, fatigue is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.3 of this SER documents the staff's review of the applicant's evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.3 of the SRP-LR.

3.5B.2.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides a separate evaluation of the applicant's quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and (2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3 AMR Results That Are Not Consistent With or Not Addressed in the GALL Report

Summary of Technical Information in the Application. In Tables 3.5.2-1 through 3.5.2-38 of the LRA, the staff reviewed additional details of the results of the AMRs for material, environment, aging effects requiring management, and AMP combinations that are not consistent with the GALL Report or are not addressed in the GALL Report.

In Tables 3.5.2-1 through 3.5.2-38, the applicant indicated, via Note F through J, that neither the identified component nor the material and environment combination is evaluated in the GALL Report and provided information concerning how the aging effects requiring management will be managed.

Staff Evaluation. For component type, material and environment combinations that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The staff evaluation is discussed below.

3.5B.2.3.1 Unit 3 Containment - Aging Management Evaluation - Table 3.5.2-1

The staff reviewed Table 3.5.2-1 of the LRA, which summarizes the results of AMR evaluations for the Unit 3 containment system component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for containment.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including fuel transfer tube gate valve, containment sump screen, neutron shield tank, reactor cavity seal ring, refueling cavity liner, pipe, valve bodies, fuel transfer tube, expansion bellows and fuel transfer tube penetration component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of an aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that, based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on concrete structures.

The applicant stated, in the LRA, that change of material properties for equipment pads/grout, jet impingement barriers, and structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls) due to alkali (cement)-aggregate reaction of concrete in a protected air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a protected air environment.

The applicant stated, in the LRA, that change of material properties for containment shell (cylindrical wall and dome), due to alkali (cement)-aggregate reaction of concrete in a protected air environment is managed by MPS AMP B2.1.16, "Inservice Inspection Program: Containment Inspections," with exceptions. The staff reviewed the inservice inspection program: containment inspections program and its evaluation is documented in Section 3.0.3.2.11 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 containment concrete structures in infrequently accessed areas. The applicant stated, in the LRA, that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, pedestals, walls) in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a protected air environment for infrequently accessed areas.

In RAI 3.5-1, the staff requested the following information:

> For item numbers 3.5.1-03 to 3.5.1-06 (Table 3.5.1) of the LRA, the applicant cited Containment ISI and Containment leak rate test as the aging management programs. A review of AMP B2.1.6 indicates that the Appendix J leak rate testing is part the ISI Program: Containment Inspections. In Appendix J program, the applicant takes credit for only Type A tests to measure the overall primary containment leakage rates. This is a major deviation from NUREG-1801, Section XI.S4 program. Also, the review indicated that the applicant is taking credit for the 1998 Edition of Subsections IWE of Section XI of the ASME Code, without citing compliance with the limitations and modifications associated with this Edition of the Code in 10 CFR 50.55a (67 FR 60520). This was a major deviation from NUREG-1801 Section XI.S1 program and requirements of the regulation. In view of these deviations, and the fact that the Type A leak rate testing may occur every 10 to 15 years, the applicant was requested to provide information as to how it plans to monitor the aging and leak-tightness of the components covered by item

numbers 3.5.1-03 to 3.5.1-06. The applicant was requested to address seals and gaskets associated with equipment hatches, air locks, and, electrical and mechanical penetrations.

By letter dated November 9, 2004, the applicant stated:

> This item was identified as Audit Item 47 during the AMP/AMR Audit conducted the week of May 3, 2004. Dominion provided a supplemental response to Audit Item 47 as documented in the Dominion letter (Serial Number 04-320) dated July 7, 2004. In this letter, it was stated that the Millstone LRA has been supplemented to additionally credit Type B Local Leak Rate Tests (in accordance with 10 CFR 50, Appendix J) as part of the Containment ISI Aging Management Program. Type B Local Leak Rate Testing will ensure that the Containment pressure boundary function associated with the seals and gaskets for equipment hatches, air-locks, and, electrical and mechanical penetrations will be maintained during the period of extended operation.
>
> The typical frequency for performing Type B Local Leak Rate tests is every four refueling outages (approximately every six years). Twenty-five percent of Type B electrical penetrations are performed on-line just prior to or following each refueling outage (approximately every 1 ½ years).

The staff finds the response to RAI 3.5-1 acceptable as the implementation of the revised process will assure the integrity of the containment pressure boundary penetrations during the period of extended operation.

In RAI 3.5-4, the staff inquired about the means of monitoring the temperatures of the containment concrete (around the high energy lines) and that of the concrete structures inside the containments, and the operating experience related to their degradation, as follows:

> In addressing item 3.5.1-27, for the reinforced concrete structures subjected to elevated temperatures (e.g., primary shield walls, pressurizer and steam generator enclosures, reactor vessel supports, and the containment concrete around high energy penetrations) the applicant stated: “NUREG-1801 is not applicable.” Items IIA1.1-h and III.A4-1c of NUREG-1801 are directly applicable to Group 4 structural concrete. For these structures, the applicant was requested to provide the following information:
>
> 1. The method(s) of monitoring the concrete temperatures in these structures.
> 2. If the primary shield wall concrete, the containment concrete, or any other structural components within Millstone 2 and 3 containments are kept below the threshold temperature (i.e., 150°F) by means of air cooling, provide the operating experience related to the performance of the cooling system.
> 3. The results of the latest inspection of these structures, in terms of cracking, spalling, and condition of reactor vessel support structures, etc.

By letter dated November 9, 2004, the applicant stated:

> 1. For Millstone Unit 2, the temperature of the primary shield wall concrete in the area of the reactor vessel supports is monitored and an alarm is provided in the control room if the temperature exceeds 150°F. Embedded cooling coils are

provided at these locations to remove heat from the concrete. Although not directly measured, the temperature of the concrete in other areas of the Unit 2 containment, and in the Unit 3 containment, is maintained below threshold values by the design of ventilation systems. The containment ventilation systems maintain average containment internal air temperature below 120°F in accordance with Technical Specification requirements. Local ambient air temperatures in areas such as the steam generator cubicles and the pressurizer cubicle are maintained well below 150°F. The localized concrete temperature in the vicinity of high energy piping containment penetrations is maintained below the threshold value by the containment penetration cooling system, which consists of a ventilation system in Unit 2 (the Containment Penetration Cooling System described in LRA Section 2.3.3.18) and a water cooling system in Unit 3 (as part of the Reactor Plant Component Cooling System described in LRA Section 2.3.3.6).

2. The containment ventilation systems operate consistently in order to provide compliance with Technical Specification containment average temperature limit of 120°F. Failures of these systems to provide adequate cooling requires plant shutdown and, therefore, the threshold values for concrete temperature would not be exceeded. The containment concrete in the area of the Unit 2 high energy piping penetrations is cooled by the containment penetration cooling system. A review of plant operating experience has indicated that this system also operates consistently and there are no identified failures that would have resulted in local concrete temperatures exceeding threshold values.

3. The latest inspections of the containment structure were performed in March 2001 and October 2003 for Unit 2 and in September 2002 for Unit 3. These inspections did not identify instances of significant cracking or spalling in the primary shield wall, pressurizer and steam generator enclosures, reactor vessel support concrete, or the containment concrete around high-energy penetrations. These inspection results provide further assurance that elevated temperature of containment concrete was not a significant concern for Millstone Unit 2 and Unit 3 containments.

The staff finds the response acceptable, as the response indicates that the applicant employs positive means to control temperatures around the high energy containment penetrations as well as around the areas likely to be subjected to elevated temperatures in the concrete.

In RAI 3.5-14 (Audit Item AFI-1), the staff requested information on the operating experience related to corrosion of steel liner for Millstone Units 2 and 3, as follows:

> In discussion of Item 3.5.1-12 in Section 3.5.2.2.1.4, the applicant notes that the moisture barrier is monitored under containment inspection program for aging degradation. The industry experience indicates that the moisture barrier degrades with time, and any moisture accumulation in the degraded barrier corrodes the steel liner. The applicant is requested to provide information regarding the operating experience related to the degradation of moisture barrier and the containment liner plate at Millstone 2 and 3. The applicant is requested to include a discussion of acceptable liner plate corrosion before it is reinstated to the nominal thickness.

In response, the applicant provided the following information:

> The containment ISI program conforms to ASME XI Subsection IWE (1998 Edition) for monitoring the effects of aging associated with both the moisture barrier and the steel liner. The inspection of moisture barriers is intended to prevent undetected intrusion of moisture to inaccessible areas of the pressure retaining liner. Subsection IWE identifies the moisture barrier examination method (visual), and the examination extent and frequency (100% each inspection period). By Subsection IWE requirements, the acceptance standards are “owner defined.” Millstone Units 2 and 3 have defined the general and detailed visual acceptance criteria in plant-specific procedures. For augmented examinations of the liner that involve Ultrasonic Testing (UT), ASME Section XI, Subparagraph IWE-3511.3 requires that loss of material in a local area projected to exceed 10% of the nominal wall thickness prior to the next examination shall be documented. Such areas are entered into the corrective action program and either accepted by engineering evaluation or corrected by performance of repair/replacement activities.
>
> For Millstone Units 2 and 3, various examples of Operating Experience associated with the moisture barrier and the liner (such as the results of baseline examinations performed under the containment ISI program) are available for review at the station. The extent of the visual examinations and the necessity of additional volumetric examinations have been as specified in the IWE Inspection Schedule. Examples of Containment operating experience for Millstone Units 2 and 3 are provided in the License Renewal Application Appendix B (Section B2.1.16).
>
> <u>Millstone Unit 2</u>
>
> The moisture barrier for the Unit 2 Containment liner was inspected in 2000 as part of the ASME Section XI, Subsection IWE examinations. The inspection revealed indications, which upon evaluation required that the moisture barrier material be removed, a detailed IWE examination of the liner be performed, the liner be recoated, and the moisture barrier be replaced. The work scope was completed in two phases, approximately 50% of the locations in outage 2R13 and the remainder in outage 2R15. During the examination, some pitting of the liner was observed and determined to be acceptable by engineering evaluation and the requirements of Subsection IWE of ASME Section XI and acceptable for continued service.
>
> <u>Millstone Unit 3</u>
>
> In 2000 the moisture barrier for the Unit 3 Containment liner was inspected as part of the ASME Section XI, Subsection IWE examinations. The inspection revealed unacceptable results where, for specific areas, the moisture barrier had not been installed. These areas were documented and repaired in accordance with Subsection IWE requirements. Detailed visual examinations of the moisture barrier are performed as directed by IWE requirements and the Millstone containment ISI program. The liner surface for the depth of the exposed joint was acceptable and required no further supplemental examination.

Recognizing the susceptibility of the below grade portion of the containment liners to corrosion, in a follow-up request, the staff requested the applicant to provide information regarding corrosion of the liners above the bottom floor levels. By letter dated December 3, 2004, the applicant provided detailed descriptions of the liner corrosion, and the results of UT measurements taken for Unit 2 in April 2000, May 2000, March 2002, and in November 2003 for Unit 2, and in February 2001 for Unit 3. A typical evaluation of liner corrosion consisted of the following approach:

> Specifically, the UT examination results indicated that the area in question had a liner wall thickness of 0.239 inches. The design nominal thickness of the liner is 0.250 inches. In accordance with ASME Section XI, Subparagraph IWE 3122.3, local areas exhibiting less than 10% wall loss are acceptable for continued service. The reading of 0.239 inches was greater than the 0.225 inches minimum wall thickness allowable (for 10 % wall loss), and therefore, met the acceptance standards of ASME Section XI.

The description also included examples where the liner thickness was found to be more than 10% of the nominal thickness allowed by Subsection IWE of Section XI of the ASME Code. In those cases the applicant performed engineering analysis to demonstrate that the liner could perform its intended function.

The above description clearly indicates that the below grade portions of the liner plate have been subjected to corrosion, and the applicant was taking appropriate actions to monitor and control the future instances of corrosion. The staff believes that an appropriate implementation of AMP B.2.1.16, “Inservice Inspection Program: Containment Inspection,” including its containment leak rate testing program will monitor and control corrosion of liner plates during the period of extended operation, and therefore, finds the process used by the applicant acceptable.

3.5B.2.3.2 Unit 3 Containment Enclosure Building - Aging Management Evaluation - Table 3.5.2-2

The staff reviewed Table 3.5.2-2 of the LRA, which summarized the results of AMR evaluations for the Unit 3 containment enclosure building component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for Class 1 structures.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. However, the applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (grade beams, slabs on grade) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

The applicant stated, in the LRA, that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant also stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents the leaching of calcium hydroxide from Class 1 structures' concrete to be of concern. Therefore, the applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures.

In the LRA, the applicant stated that change of material properties for structural reinforced concrete (grade beams, slabs on grade) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

Tables 3.5.2-2 of Units 2 and 3 are related to the aging management of the enclosure buildings surrounding the containments. For Unit 2, the applicant has incorporated the aging management of blow-off panels. This is not the case for Unit 3. The applicant was requested to discuss the reasons for the difference.

By letter dated December 3, 2004, the applicant provided the following response:

> The main steam lines for Millstone Unit 2 go through the enclosure building, and the potential exists for excessive pressure to build-up inside this building during a main steam line leak. For this reason blow-off panels were incorporated into the Unit 2 enclosure building design, and the aging management of these blow-off panels has been included for License Renewal.
>
> The main steam lines for Millstone Unit 3 go through the main steam valve building, and not the enclosure building. For this reason blow-off panels are installed in the main steam valve building, and the aging management of these blow-off panels has been included for License Renewal. Because the main steam lines for Millstone Unit 3 do not go through the enclosure building, the potential for excessive pressure to build-up inside this building does not exist, and blow-off panels were not installed.

The staff finds the clarification acceptable.

3.5B.2.3.3 Unit 3 Auxiliary Building - Aging Management Evaluation - Table 3.5.2-3

The staff reviewed Table 3.5.2-3 of the LRA, which summarized the results of AMR evaluations for the Unit 3 auxiliary building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that the GALL Report does not include stainless steel sump liners in a raw water environment. The applicant stated that loss of material due to crevice corrosion/under deposit attack of stainless steel is possible in a raw water environment. The sump liners have either the necessary geometry or the material deposits and oxygen greater than 100 ppb, which are required to support crevice corrosion/under deposit attack. The applicant concludes crevice corrosion/under-deposit attack is a potential aging mechanism. On the basis of it review, the staff agrees with the applicant's conclusion.

The applicant stated, in the LRA, that sump liners are exposed to an aqueous environment with temperatures less than 210 °F and a pH of less than 10. Therefore, the applicant concludes that MIC is a potential aging mechanism. The applicant stated, in the LRA, that the sump liners are exposed to low flow conditions with an aggressive environment. Therefore, the applicant concludes that pitting corrosion is a potential aging mechanism. On the basis of its review, the staff agrees with the applicant's conclusion.

In the LRA, the applicant stated that loss of material for sump liners due to crevice corrosion/under-deposit attack, MIC, and pitting corrosion of stainless steel in a raw water environment is managed by MPS AMP B2.1.25, "Work Control Process," which is a plant-specific program. The staff reviewed the work control process program and its evaluation is documented in Section 3.0.3.3.4 of this SER. The staff finds that the work control process program credits visual inspection for the detection of loss of material in structures. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of loss of material due to crevice corrosion/under-deposit attack, MIC, and pitting corrosion of stainless steel in a raw water environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; hatches, missile barriers, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and tunnel due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 Structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs), hatches, and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, for change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures in infrequently accessed areas. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and tunnel in an air environment is managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” which is a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5B.2.3.4 Unit 3 Control Building - Aging Management Evaluation - Table 3.5.2-4

The staff reviewed Table 3.5.2-4 of the LRA, which summarized the results of AMR evaluations for the Unit 3 control building component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures’ concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls), hatches, and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including control room ceiling support component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, carbon steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

3.5B.2.3.5 Unit 3 Fuel Building - Aging Management Evaluation - Table 3.5.2-5

The staff reviewed Table 3.5.2-5 of the LRA, which summarized the results of AMR evaluations for the Unit 3 fuel building component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that loss of material for stainless steel spent fuel storage racks exposed to treated water is managed using MPS AMP B2.1.5, “Chemistry Control for Primary Systems Program.” The staff reviewed the chemistry control for primary systems program and its evaluation is documented in Section 3.0.3.2.2 of this SER. The staff finds this program is consistent which is consistent with GALL AMP XI.M2, “Water Chemistry,” with an acceptable exception. On the basis of its review, the staff finds this line item acceptable since this program is consistent with the GALL Report recommendation for other components with the same material, environment, and aging effect.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including miscellaneous steel (embedded steel-exposed surfaces, shapes, plates, unistrut, etc., ladders, platforms and grating, stairs), cask wash pit liner and new fuel storage rack component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended

operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; hatches, structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls), and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures in infrequently accessed areas. In the LRA, the applicant stated that change of material properties for tunnel in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," which is a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in

Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5B.2.3.6 Railroad Canopy - Aging Management Evaluation - Table 3.5.2-6

The staff reviewed Table 3.5.2-6 of the LRA, which summarized the results of AMR evaluations for the railroad canopy component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16. The staff has reviewed this program with respect to the SRP-LR and found it acceptable. For these components, the staff finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.7 Unit 3 Hydrogen Recombiner Building - Aging Management Evaluation - Table 3.5.2-7

The staff reviewed Table 3.5.2-7 of the LRA, which summarized the results of AMR evaluations for the Unit 3 hydrogen recombiner building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs), missile barriers and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.8 Unit 3 Engineered Safety Features Building - Aging Management Evaluation - Table 3.5.2-8

The staff reviewed Table 3.5.2-8 of the LRA, which summarized the results of AMR evaluations for the Unit 3 engineered safety features building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, hatches, and structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures

Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for hatches, and structural reinforced concrete (beams, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.9 Unit 3 Main Steam Valve Building - Aging Management Evaluation - Table 3.5.2-9

The staff reviewed Table 3.5.2-9 of the LRA, which summarized the results of AMR evaluations for the MPS Unit 3 main steam valve building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, and structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, roof slabs, walls) and missile barriers due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.10 Unit 3 Emergency Generator Enclosure and Fuel Oil Tank Vault - Aging Management Evaluation - Table 3.5.2-10

The staff reviewed Table 3.5.2-10 of the LRA, which summarized the results of AMR evaluations for the MPS Unit 3 emergency generator enclosure and fuel oil tank vault component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for Class 1 structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers, including curbs, dikes, toe plates, and stop logs; fuel oil tank vault, structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from Class 1 structures' concrete. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs,

slabs on grade walls), and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 Class 1 concrete structures in infrequently accessed areas. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, roof slabs, slabs on grade walls), and hatches in an air environment is managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” which is a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5B.2.3.11 Unit 2 Fire Pumphouse - Aging Management Evaluation - Table 3.5.2-11

The staff reviewed Table 3.5.2-11 of the Unit 3LRA, which summarized the results of AMR evaluations for the Unit 2 fire pumphouse component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, “Structures Monitoring Program.” The applicant stated that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

3.5B.2.3.12 Unit 3 Fire Pumphouse - Aging Management Evaluation - Table 3.5.2-12

The staff reviewed Table 3.5.2-12 of the LRA, which summarized the results of AMR evaluations for the Unit 3 fire pumphouse component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant stated that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

3.5B.2.3.13 Unit 3 Service Building - Aging Management Evaluation - Table 3.5.2-13

The staff reviewed Table 3.5.2-13 of the LRA, which summarized the results of AMR evaluations for the Unit 3 service building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, footing, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.14 Unit 3 Turbine Building - Aging Management Evaluation - Table 3.5.2-14

The staff reviewed Table 3.5.2-14 of the LRA, which summarized the results of AMR evaluations for the Unit 3 turbine building component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers including curbs, dikes, toe plates and stop logs, structural reinforced concrete (beams, columns, floor slabs, footing, and grade beams, walls) and turbine pedestal due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, and grade beams, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.15 Unit 3 Auxiliary Boiler Enclosure - Aging Management Evaluation - Table 3.5.2-15

The staff reviewed Table 3.5.2-15 of the LRA, which summarized the results of AMR evaluations for the Unit 3 auxiliary boiler enclosure component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS

AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.16 Unit 3 Technical Support Center - Aging Management Evaluation - Table 3.5.2-16

The staff reviewed Table 3.5.2-16 of the LRA, which summarized the results of AMR evaluations for the Unit 3 technical support center component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, footing, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.17 Unit 3 Maintenance Shop - Aging Management Evaluation - Table 3.5.2-17

The staff reviewed Table 3.5.2-17 of the LRA, which summarized the results of AMR evaluations for the Unit 3 maintenance shop component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.18 Unit 3 Waste Disposal Building - Aging Management Evaluation - Table 3.5.2-18

The staff reviewed Table 3.5.2-18 of the LRA, which summarized the results of AMR evaluations for the MPS Unit 3 waste disposal building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, slabs on grade, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, floor slabs, spread footings, slabs on grade, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant stated that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

3.5B.2.3.19 SBO Diesel Generator Enclosure and Fuel Oil Tank Vault - Aging Management Evaluation - Table 3.5.2-19

The staff reviewed Table 3.5.2-19 of the LRA, which summarized the results of AMR evaluations for the SBO diesel generator enclosure and fuel oil tank vault component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation, mat slabs) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation, mat slabs) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the staff's MPS audit and review report for the AMR for the Unit 3 miscellaneous structures, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant also identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the staff's MPS audit and review report for the AMR for the Unit 3 miscellaneous structures, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment, there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

3.5B.2.3.20 Unit 3 Condensate Polishing Enclosure - Aging Management Evaluation - Table 3.5.2-20

The staff reviewed Table 3.5.2-20 of the LRA, which summarized the results of AMR evaluations for the Unit 3 condensate polishing enclosure component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, spread footing, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.21 Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation - Table 3.5.2-21

The staff reviewed Table 3.5.2-21 of the LRA, which summarized the results of AMR evaluations for the Unit 2 condensate polishing facility and warehouse No. 5 component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.22 Security Diesel Generator Enclosure - Aging Management Evaluation - Table 3.5.2-22

The staff reviewed Table 3.5.2-22 of the LRA, which summarized the results of AMR evaluations for the security diesel generator enclosure component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to air, including roofing, siding and structural framing component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the staff's MPS audit and review report for the Unit 3 miscellaneous structures, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including roofing and siding component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the staff's MPS audit and review report for the AMR for Unit 3 miscellaneous structures, for aluminum in an air or an atmosphere/weather environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

3.5B.2.3.23 Stack Monitoring Equipment Building - Aging Management Evaluation - Table 3.5.2-23

The staff reviewed Table 3.5.2-23 of the LRA, which summarized the results of AMR evaluations for the stack monitoring equipment building component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (roof slabs, slabs on grade, spread footing, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant stated that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

3.5B.2.3.24 Unit 3 Stack - Aging Management Evaluation - Table 3.5.2-24

The staff reviewed Table 3.5.2-24 of the LRA, which summarized the results of AMR evaluations for the Unit 3 stack component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures in infrequently accessed areas. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, foundation mat, slabs, walls) in an air environment is managed by MPS AMP B2.1.15, "Infrequently Accessed Areas Inspection Program," a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5B.2.3.25 Switchyard Control House - Aging Management Evaluation - Table 3.5.2-25

The staff reviewed Table 3.5.2-25 of the LRA, which summarized the results of AMR evaluations for the switchyard control house component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.3.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that cracking for concrete component types (masonry block walls) exposed to an atmosphere/weather environment is managed using MPS AMP B2.1.23, "Structures Monitoring Program." The applicant stated that cracking of masonry block walls due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction, is possible in an atmosphere/weather environment. Masonry block walls are subject to all of these aging mechanisms which require aging management. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of concrete cracking due to long term creep and variation in stiffness, dry shrinkage of concrete, and expansion or contraction in this environment.

3.5B.2.3.26 345kV Switchyard - Aging Management Evaluation - Table 3.5.2-26

The staff reviewed Table 3.5.2-26 of the LRA, which summarized the results of AMR evaluations for the 345 kV switchyard component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated change of material properties for structural reinforced concrete due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.27 Unit 3 Circulating and Service Water Pumphouse - Aging Management Evaluation - Table 3.5.2-27

The staff reviewed Table 3.5.2-27 of the LRA, which summarized the results of AMR evaluations for the Unit 3 circulating and service water pumphouse component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for intake and discharge structures.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including miscellaneous aluminum (embedded aluminum exposed surfaces) (shapes, plates, unistrut, etc. ladders, platforms and grading) component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the staff’s MPS audit and review report for the AMR for Unit 3 intake and discharge structures, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for flood/spill barriers including curbs, dikes, toe plates, and stop logs; structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) and hatches due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

Structures monitoring program and infrequently accessed area inspection program were listed as AMPs for structural reinforced concrete (beams, columns, floor slabs, foundation mat slabs, roof slabs, walls) under column “Structural Member” and under column “Notes” H, 20 in Tables 3.5.2-18 for Unit 2 and H, 23 in Table 3.5.2-27 for Unit 3. In RAI 3.5-7, the applicant was requested to identify the structural components, such as beams and walls that are managed by either program or by both programs and provide basis for the selection of the program.

By letter dated November 9, 2004, the applicant stated that the structural member "Structural Reinforced Concrete" in Unit 2 LRA Table 3.5.2-18 and Unit 3 LRA Table 3.5.2-27 includes beams, columns, floor slabs, foundation mat slabs, roof slabs, and walls. The structural reinforced concrete components associated with the table line item with Note H, 20 (Unit 2) or H, 23 (Unit 3) are only the floor slabs, foundation mat slabs, and walls. As indicated in Note 20 in the Unit 2 LRA table (or Note 23 in the Unit 3 LRA table), the infrequently accessed area inspection program manages the effects of aging for structural members/components in the intake structure water bays between the waterline and the bottom of the intake structure operating deck since this area is infrequently accessed as described in LRA Appendix B, Section B2.1.15. The structures monitoring program manages the effects of aging for structural members/components in the water bay below the waterline since this area is inspected by the structures monitoring program AMP. The effects of aging for the walls are managed by both the infrequently accessed areas inspection program (above the waterline) and the structures monitoring program (below the waterline). The infrequently accessed area inspection program manages the effects of aging for the floor slabs (underside of the operating deck) and the structures monitoring program manages the effects of aging for the foundation mat slabs.

The staff finds the applicant’s response acceptable because it identifies each component and its associated AMP.

3.5B.2.3.28 Unit 3 West Retaining Rail - Aging Management Evaluation - Table 3.5.2-28

The staff reviewed Table 3.5.2-28 of the LRA, which summarized the results of AMR evaluations for the Unit 3 west retaining rail component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footing, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

3.5B.2.3.29 Sea Wall - Aging Management Evaluation - Table 3.5.2-29

The staff reviewed Table 3.5.2-29 of the LRA, which summarized the results of AMR evaluations for the sea wall component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footings, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program. The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at

MPS Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on MPS Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footing, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

3.5B.2.3.30 Unit 3 Circulating Water Discharge Tunnel and Discharge Structure - Aging Management Evaluation - Table 3.5.2-30

The staff reviewed Table 3.5.2-30 of the LRA, which summarized the results of AMR evaluations for the Unit 3 circulating water discharge tunnel and discharge structure component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in a sea water environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (floor slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in a sea water environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in a sea water environment.

3.5B.2.3.31 Unit 3 Recirculation Tempering Line - Aging Management Evaluation - Table 3.5.2-31

The staff reviewed Table 3.5.2-31 of the LRA, which summarized the results of AMR evaluations for the Unit 3 recirculation tempering line component groups.

In RAI 3.5-13, the staff requested a clarification as to the reason of listing infrequently accessed area inspection program three times as the AMP for concrete pipes.

By letter dated November 9, 2004, the applicant stated Each line item for concrete pipe in Unit 2 LRA Table 3.5.2-21 on page 3-507 and in Unit 3 Table 3.5.2-31 on page 3-613 is a unique line item with a corresponding NUREG-1801 Volume 2 Item and/or a note. As a result, some table data (such as the AMP) is repeated multiple times for these lines. For example, for the lines in the tables associated with the change of material properties aging effect for the concrete pipe, the first line is associated with NUREG-1801 item III.A6.1-b for the leaching of calcium hydroxide aging mechanism. The second line is associated with NUREG-1801 item III.A6.1-e for the aggressive chemical attack aging mechanism. Finally, the third line is not associated with a NUREG-1801 item since the alkali-aggregate reaction aging mechanism leading to a change of material properties is not included in NUREG-1801, although Dominion has conservatively included this aging mechanism as discussed in LRA Appendix C, Section C3.2.2. For each of these aging mechanisms that result in the change of material properties aging effect for the concrete pipe, the infrequently accessed areas inspection program AMP manages the identified aging effect.

The staff finds the applicant’s response acceptable.

3.5B.2.3.32 Vacuum Priming Pumphouse - Aging Management Evaluation - Table 3.5.2-32

The staff reviewed Table 3.5.2-32 of the LRA, which summarized the results of AMR evaluations for the vacuum priming pumphouse component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for intake and discharge structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (beams, foundation mat slabs, roof slabs, walls) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.33 Tank Foundations - Aging Management Evaluation - Table 3.5.2-33

The staff reviewed Table 3.5.2-33 of the LRA, which summarized the results of AMR evaluations for the tank foundations component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for the structural reinforced concrete (foundation mat slabs, walls) (Unit 3 Boron Recovery Tanks and Enclosure) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs) (condensate storage tank foundation); structural reinforced concrete (footing) (fire water tanks 1 and 2 foundations); structural reinforced concrete (foundation mat slabs) (refueling water storage tank foundation); structural reinforced concrete (foundation mat slabs) (SBO diesel fuel oil storage tank foundation); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (demineralized water storage tank foundation and enclosure); structural reinforced concrete (foundation mat slabs) (carbon dioxide tank foundation); and structural reinforced concrete (foundation mat slabs, walls) (boron recovery tank foundation and enclosure) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

3.5B.2.3.34 Yard Structures - Aging Management Evaluation - Table 3.5.2-34

The staff reviewed Table 3.5.2-34 of the LRA, which summarized the results of AMR evaluations for the yard structures component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structures.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including lighting pole component types. The GALL Report does not include this material for these components.

The applicant concludes, as documented in the Unit 3 technical report for miscellaneous structures, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant’s documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for the access covers (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (pipe tunnel); and structural reinforced concrete (foundation mat slabs, roof slabs, walls) (manholes) due to alkali (cement)-aggregate reaction of concrete in an air environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete is possible in an atmosphere/weather environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that the use of high-density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking, prevents significant leaching of calcium hydroxide from concrete structures. The applicant will manage change of material properties as a potential aging effect on Unit 3 concrete structures. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (footing, walls) (transformer firewalls and dikes); access covers (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (yard valve pits and enclosure); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (Pipe Tunnel); structural reinforced concrete (foundation mat slabs, roof slabs, walls) (Manholes); duct banks; structural reinforced concrete (security lighting supports); and structural reinforced concrete (footing, walls) (technical support building) due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment is managed by MPS AMP B2.1.23, “Structures Monitoring Program.” The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction and leaching of calcium hydroxide of concrete in an atmosphere/weather environment.

In the LRA, the applicant stated that change of material properties due to alkali (cement)-aggregate reaction of concrete is possible in an air environment. The applicant stated that based on tests conducted on the aggregate and the low-alkali cement used at Unit 3, alkali (cement)-aggregate reaction is not a significant concern. The applicant stated that it will manage change of material properties as a potential aging effect on Unit 3 concrete structures in infrequently accessed areas. In the LRA, the applicant stated that change of material properties for structural reinforced concrete (foundation mat slabs, roof slabs, walls) (yard valve pits and enclosure) in an air environment is managed by MPS AMP B2.1.15, “Infrequently Accessed Areas Inspection Program,” which is a plant-specific program. The staff reviewed the infrequently accessed area inspection program and its evaluation is documented in Section 3.0.3.3.3 of this SER. The staff also reviewed this program with respect to the SRP-LR. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to alkali (cement)-aggregate reaction of concrete in an air environment for infrequently accessed areas.

3.5B.2.3.35 NSSS Equipment Supports - Aging Management Evaluation - Table 3.5.2-35

The staff reviewed Table 3.5.2-35 of the LRA, which summarized the results of AMR evaluations for the NSSS equipment supports component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for NSSS equipment supports.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including pressurizer support: bolting component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant stated that the GALL Report does not include a borated water leakage environment for reactor vessel support: sliding support plate of copper alloy material.

The applicant identifies, in the Unit 3 technical report for NSSS equipment supports, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant stated that these components do not exceed the temperature threshold of 350°F. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the staff concurs with the applicant and finds that boric acid corrosion is a potential aging mechanism for copper alloys.

In the LRA, the applicant stated that loss of material for copper alloy reactor vessel support: sliding support plate in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring." The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program, manages these aging effects by visual inspections for evidence of degradation or adverse conditions and includes heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the staff finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this component.

In the discussion section of LRA Table 3.5.1, Item 3.5.1-33, the applicant stated, for Group B1.1: high strength low-alloy bolts in structures and component support systems, that cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting.

During the review, the staff noted that SRP-LR Table 3.5-1 recommended GALL AMP XI.M18, "Bolting Integrity," for managing high strength bolting for NSSS components supports for crack initiation and growth due to SCC.

By letter dated January 11, 2005, the applicant stated:

> For NSSS component supports, bolting material with estimated maximum yield strength that marginally exceeds 150 ksi is used in limited applications. This bolting is located inside the Containment in areas where the environment is typically dry and not subject to high levels of contaminants, such as halogens and sulfur compounds, that result in the

potential for SCC. Leakage within the Containment is monitored and strictly controlled during plant operation and is investigated and corrected such that the potential for wetting of NSSS component support bolting is minimal. Based on the marginally susceptible bolting materials and a dry, non-conducive (benign) service environment, cracking due to SCC is not an aging effect requiring management for this bolting.

> As identified in Millstone Power Station Unit 2 LRA Table 3.5.2-24 and Millstone Power Station Unit 3 LRA Table 3.5.2-35, loss of material is conservatively considered an aging effect requiring management for NSSS component support bolting and is managed by the Inservice Inspection Program: Systems, Components and Supports AMP (which includes the elements of the ASME Section XI, Subsection IWF requirements as described in LRA Appendix B2.1.18). In addition, loss of material due to the potential for borated water leakage from nearby components is managed by the Boric Acid Corrosion and General Condition Monitoring AMPs.

Since the boric acid corrosion and general condition monitoring programs ensure a dry, non-conducive (benign) service environment and the bolting material is managed by the inservice inspection program, the staff finds this acceptable.

3.5B.2.3.36 General Structural Supports - Aging Management Evaluation - Table 3.5.2-36

The staff reviewed Table 3.5.2-36 of the LRA, which summarized the results of AMR evaluations for the general structural supports component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for general structural supports.

The GALL Report does not include this material for these components. The applicant concluded, as documented in the staff's MPS audit and review report for the AMR for the Unit 3 miscellaneous structures, for aluminum in an air or an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and concludes that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant has identified no aging effects for aluminum components exposed to an air environment, including electrical conduit and cable tray component types. The GALL Report does not include this material for these components. The applicant concludes, as documented in the Unit 3 technical report for miscellaneous structures, for aluminum in an air or an air environment, the applicant concludes that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and concludes that there are no aging effects requiring management for aluminum in an air environment.

In the LRA, the applicant identified no aging effects for stainless steel components exposed to air, including sliding support bearing and sliding surfaces, structural support components (plate structural shapes, etc.) and vendor supplied specialty items (spring hangers, struts, clamps, vibration isolators, etc.) component types.

During the audit and review, the staff asked the applicant why the MPS AMP B.2.1.18, "Inservice Inspection Program: Systems, Components and Supports," was not credited to mange loss of mechanical function, as described in the GALL Report. By letter dated January 11, 2005, the applicant stated that the inspection requirements for these supports associated with ASME XI IWF that are part of the CLB will carry forward to the period of extended operation.

On the basis of its review, the staff concurred with the applicant concerning the adequacy of inspections in accordance with ASME XI IWF.

In the LRA, the applicant stated that the GALL Report does not include a borated water leakage environment for sliding support bearing and sliding surfaces of copper alloy material.

The applicant identified, as documented in Unit 3 Technical Report, MP-LR-4651, "General Structural Supports," Revision 2, for copper alloys in a borated water leakage environment, that boric acid corrosion as an aging mechanism for loss of material. The applicant stated that these components do not exceed the temperature threshold of 350 °F. Therefore, boric acid corrosion is a potential aging mechanism for copper alloys. On the basis of its review of the applicant's document, the staff concurred with the applicant and concluded that boric acid corrosion is a potential aging mechanism for copper alloys. In the LRA, the applicant stated that loss of material for copper alloy reactor vessel support: sliding support plate in a borated water leakage environment is managed by MPS AMP B2.1.13, "General Condition Monitoring." The staff reviewed the general condition monitoring program and its evaluation is documented in Section 3.0.3.3.2 of this SER. The general condition monitoring program, managed these aging effects by visual inspections for evidence of degradation or adverse conditions and included heath physics inspections of radiologically controlled areas, system walkdowns by system engineering, and daily inspections of accessible areas of the plant by plant operators. Evidence of boron precipitation and active radioactive system leaks is identified during area observations made by health physics technicians while performing radiologically controlled area surveys. On the basis of its review, the staff finds the general condition monitoring program acceptable for managing the aging effect of loss of material for copper alloys for this component.

In the LRA, the applicant identified no aging effects for galvanized steel components exposed to air, including electrical conduit and cable tray component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon (galvanized steel) and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff concluded that there are no aging effects requiring management for metal in an air environment.

Table 3.5.2-25 of Unit 2 and Table 3.5.2-36 of Unit 3 list boric acid corrosion as an AMP for galvanized steel electrical conduit and cable trays. The staff did not find that galvanized steel was included in the boric acid corrosion program as described in B2.1.3. In RAI 3.5-12, the staff requested the applicant to address this discrepancy.

By letter dated November 9, 2004, the applicant provided the following response:

> The electrical conduit and cable trays listed in Unit 2 LRA Table 3.5.2-25 and Unit 3 LRA Table 3.5.2-36 are fabricated from carbon steel material that was galvanized for corrosion protection, and has been termed “galvanized steel” in the tables. Since no credit has been taken for the galvanized coating as described in LRA Appendix C, Section C2.4, the electrical conduit and cable trays loss of material aging effect due to boric acid corrosion is managed with the Boric Acid Corrosion program. Accordingly, this material is in the category of materials termed “carbon and low alloy steel” in the Boric Acid Corrosion program as described in B2.1.3.

The staff finds the applicant’s response acceptable.

3.5B.2.3.37 Miscellaneous Structural Commodities - Aging Management Evaluation - Table 3.5.2-37

The staff reviewed Table 3.5.2-37 of the LRA, which summarized the results of AMR evaluations for the miscellaneous structural commodities component groups. The staff interviewed the applicant’s technical staff and reviewed the Unit 3 technical report for miscellaneous structural commodities.

In the LRA, the applicant stated that the GALL Report does not include Pyrocrete for fire resistant coating in an air environment. The applicant identified, as documented in the staff’s MPS audit and review report for the AMR for the Unit 3 miscellaneous structural commodities, for Pyrocrete in an air environment, irradiation as an aging mechanism for change of material properties. The applicant stated that fire resistant coating material may be exposed to ionizing radiation values greater than the threshold radiation of 10E6 Rads. On the basis of its review of the applicant’s documentation, the staff concurs with the applicant and finds that irradiation is a potential aging mechanism for Pyrocrete. In the LRA, the applicant stated that change of material properties for fire resistant coatings in an air environment is managed by MPS AMP B2.1.10, “Fire Protection Program,” with exception. The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in the condition such as change in material properties. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of change in material properties due to irradiation of Pyrocrete in an air environment.

In the LRA, the applicant stated that the GALL Report does not include Pyrocrete for fire resistant coating in an air environment. The applicant identified, as documented in the staff’s MPS audit and review report for the AMR for Unit 3 miscellaneous structural commodities, for Pyrocreter in an air environment, differential movement, shrinkage, and vibration as an aging mechanisms for cracking. The applicant stated that fire resistant coating materials are subject to cracking due to differential movement, shrinkage, and vibration. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that differential movement, shrinkage, and vibration are potential aging mechanisms for Pyrocrete. In the Unit 3 LRA, the applicant stated that cracking for fire resistant coatings in an air environment is managed by MPS AMP B2.1.10, "Fire Protection Program," with exception. The staff reviewed the fire protection program and its evaluation is documented in Section 3.0.3.2.7 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that the fire protection program, with an exception, manages, through periodic inspection and tests, the aging effects on penetration seals, fire barrier walls, ceilings, floors, and all fire rated doors that perform a fire barrier intended function. Qualified personnel perform periodic inspections to identify any changes in the condition such as change in material properties. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to differential movement, shrinkage, and vibration of Pyrocrete in an air environment.

In the LRA, the applicant stated that there are no aging effects for ceramic fire/equipment qualification barrier penetration seals and concludes that no AMPs are required. The applicant stated that its AMR conclusion for the material is consistent with the GALL Report, which only calls for aging management of ceramic fire barrier penetration seals that are exposed to an outdoor environment. On the basis of its review of the applicant's documentation and that the ceramic materials are exposed only to indoor environments, the staff concurs with the applicant and finds that ceramic fire/equipment qualification barrier penetration seals do not require aging management for the period of extended operation.

In the LRA, the applicant identified no aging effects for carbon steel components exposed to air, including cable tray cover and assembly; junction, terminal, and pull boxes; bus duct enclosures; panels and cabinets; switchgear enclosures; and electrical component supports within cabinets and panels component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Significant corrosion of carbon and low-alloy steel requires an electrolytic environment, and a simultaneous presence of oxygen and moisture. Without the presence of the aggressive environment, low-alloy steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

In the LRA, the applicant stated that the GALL Report does not include cracking of rubber for flood prevention plugs in an air environment. The applicant identifies, in the Unit 3 technical report for miscellaneous structural commodities, for rubber in an air environment, thermal exposure as an aging mechanism for cracking. The applicant stated that rubber for flood prevention plugs may be exposed to temperatures greater than the threshold of 95 °F. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that thermal exposure is a potential aging mechanism for rubber.

In the LRA, the applicant also stated that cracking for rubber flood prevention plugs in an air environment is managed by MPS AMP B2.1.23, "Structures Monitoring Program." The staff reviewed the structures monitoring program and its evaluation is documented in Section 3.0.3.2.16 of this SER. The staff also reviewed this program with respect to the SRP-LR. The staff finds that structural monitoring activities are intended to assess the overall integrity and condition of structures, components, support systems and specified architectural details. Qualified personnel perform periodic inspections to identify any changes in the condition such as cracking. On the basis of its review, the staff finds this program acceptable for managing the aging effects, for the above components, of cracking due to thermal exposure of rubber in an air environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an atmosphere/weather environment, including bus duct enclosure component types. The GALL Report does not include this material for these components. In the Unit 3 technical report for miscellaneous structural commodities, for aluminum in an air environment, the applicant concludes that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an atmosphere/weather environment.

In the LRA, the applicant identified no aging effects for aluminum components exposed to an air environment, including cable tray cover assemblies and bus duct enclosure component types. The GALL Report does not include this material for these components. The applicant concludes, in the Unit 3 technical report for miscellaneous structural commodities, for aluminum in an air environment, that there are no potential aging mechanisms for this aluminum and environment combination. The applicant stated in the MAER that for aluminum material in an air or atmosphere/weather environment there are no potential aging mechanisms for this material and environment combination at Unit 3. This conclusion is based on engineering text references that indicate that aluminum and its alloys resist attack to a wide range of environments and many chemical compounds. On the basis of its review of the applicant's documentation, the staff concurs with the applicant and finds that there are no aging effects requiring management for aluminum in an air environment.

The applicant stated, as documented in the "Miscellaneous Structural Commodities" section of the Unit 3 technical report for miscellaneous structural commodities, as follows:

> The MAER includes an evaluation of aluminum material in an air or an atmosphere/weather environment, and concludes that there are no potential aging mechanisms for these material/environment combinations.

During the audit and review, the staff asked the applicant to explain why the evaluation is not in the MAER and provide the basis for its conclusions. The applicant that the MAER addressed aluminum material in an air or atmosphere/weather environment, and concluded that there are no potential aging mechanisms for these material/environment combinations at Unit 3. The applicant stated that this conclusion is based on engineering test references, "Handbook of

Corrosion Data" and "Uhlig's Corrosion Handbook." The Handbook of Corrosion Data indicates that aluminum and its alloys resist attack by a wide range of environments and many chemical compounds. Consequently, aluminum is one of the metals most thought of by the public and engineering community when lower temperature corrosion resistance is considered. Uhlig's Corrosion Handbook indicates that aluminum-based alloys as a class are highly resistant to normal outdoor exposure conditions. This conclusion in the MAER is also based on other nuclear power stations license renewal safety evaluation reports (SERs) (i.e., Turkey Point, St. Lucie, and Surry) that have environments, particular as outdoor environments, similar to Unit 3. Further, this conclusion is also supported by a review of Unit 3 plant-specific operating experience, which identifies no instances of loss of material for aluminum in an air or atmosphere/weather environment. The applicant also stated that the conclusions in the LRA remain valid and unchanged. However, the applicant initiated a change request to revise the MAER technical report document to include these references in the aluminum/air and aluminum/atmosphere/weather sections. On the basis of its review, the staff finds the applicant's response acceptable.

The applicant stated, as documented in the staff's MPS audit and review report for the Unit 3 miscellaneous structural commodities, that the information for fire/EQ barrier penetration seals (including ceramic damming material) indicated "Not Applicable" for the evaluation group. During the audit and review, the staff asked the applicant to explain how the ceramic damming material was evaluated for aging effects. The applicant stated that ceramic materials are similar to the glass and porcelain that are described in the MAER as having no aging effects. As documented in the staff's MPS audit and review report, the applicant stated that it does not properly document this conclusion and the MAER does not specifically address ceramics. The applicant stated that the conclusions in the LRA remain valid and unchanged. However, the applicant has initiated a change request to revise the MAER technical report to include ceramic along with glass and porcelain as having no aging effects that require evaluation for any application or environment to which it is exposed. In addition, the applicant initiated change requests to revise the Unit 3 miscellaneous structural commodities to indicate that the MAER indicates no potential aging effects and no aging management required for ceramics; therefore, the AMR does not evaluate aging mechanisms for the ceramic blanket or ceramic board in an air environment. On the basis of its review, the staff finds the applicant's response acceptable.

The polyethylene form used for expansion joint/seismic gap material between adjacent buildings/structures in the atmosphere/weather environment is listed as no aging effect requiring management in Table 3.5.2-37 of Unit 3. In RAI 3.5-8, the applicant was requested to provide technical data to show that the polyethylene form material will not degrade in the atmosphere/weather environment and the plant operating experience to substantiate it.

By letter dated November 9, 2004, the applicant responded that The polyethylene foam material used for seismic gap filler is covered by a flashing and not exposed to rain, wind, or sun. There should not have been an Expansion joint/Seismic gap material line item in LRA Table 3.5.2-37 with an atmosphere/weather environment. As indicated in Table 3.5.2-37, aging effects for the polyethylene foam are managed by the structures monitoring program.

The staff finds the applicant's response acceptable.

Table 3.5.2-37 of Unit 3 lists structures monitoring program as the AMP for neoprene used for flood gate gasket, roof hatch seals, and watertight door gasket, but lists Work

Control Process as the AMP for neoprene used for gaskets in junction, terminal, and pull boxes. In RAI 3.5-9, the applicant was requested to explain the need for using different AMPs for the same material.

By letter dated November 9, 2004, the applicant responded that the structures monitoring program AMP manages the aging effects for flood gates, roof hatches, and watertight doors, which are considered to be structural members, and includes inspection of the associated flood gate gasket, roof hatch seals, and watertight door gaskets. The structures monitoring program AMP does not include inspection of junction, terminal, and pull boxes since these items are not considered to be structural members. Therefore, the work control process AMP is credited for managing aging effects associated with gaskets in junction, terminal and pull boxes.

The staff finds the applicant's response acceptable.

Table 3.5.2-37 listed no aging effect requiring management for carbon steel junction, terminal, and pull boxes in air environment. In RAI 3.5-10, the applicant was requested to provide data to show that the carbon steel will not rust in the air that may contain moisture and the plant operating experience to substantiate it.

By letter dated November 9, 2004, the applicant stated that as described in note 35 for the carbon steel junction, terminal, and pull boxes in LRA Table 3.5.2-37, loss of material is not an applicable aging effect since these components are not exposed to an intermittent wetted environment.

This conclusion is consistent with the North Anna and Surry License Renewal SER concurrence that carbon steel components have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of cyclic or intermittent wetting (North Anna Power Station Units 1 and 2, and Surry Power Station, Units 1 and 2, NUREG-1766, Section 3.8.5.2.1, Page 3-230). Further, this conclusion is supported by a review of Millstone plant-specific operating experience, which identifies no instances of loss of material due to corrosion of the junction, terminal, and pull boxes in an air environment.

The staff finds the applicant's response acceptable.

3.5B.2.3.38 Load Handling Cranes and Devices - Aging Management Evaluation - Table 3.5.2-38

The staff reviewed Table 3.5.2-38 of the LRA, which summarized the results of AMR evaluations for the load handling cranes and devices component groups. The staff interviewed the applicant's technical staff and reviewed the Unit 3 technical report for load handling cranes and devices.

In the LRA, the applicant has identified no aging effects for stainless steel components exposed to air, including fuel transfer system support members (structural base supports, tracks and anchorage) component types. Air is not identified in the GALL Report as an environment for these components and materials.

On the basis of its review of current industry research and operating experience, the staff finds that air on metal will not result in aging that will be of concern during the period of extended

operation. The external environments being referred to are typical of ambient air (e.g., under a shelter, indoor, or air-conditioned enclosure or room). Without the presence of the aggressive environment, stainless steel components will experience insignificant amounts of corrosion, and no aging effects are applicable to this component/commodity group. Therefore, the staff finds that there are no aging effects requiring management for metal in an air environment.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the containment, structures and component supports systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the containment, structures and component supports systems, as required by 10 CFR 54.21(d).

3.6 Aging Management of Electrical and Instrumentation and Controls

This section of the SER documents the staff's review of the applicant's AMR results for the electrical and instrumentation and controls components and component groups associated with the following systems:

- cable and connectors
- electrical penetrations
- bus duct

3.6.1 Summary of Technical Information in the Application

In LRA Section 3.6, the applicant provided AMR results for electrical and instrumentation and controls components and component groups. In LRA Table 3.6.1, "Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the electrical and instrumentation and controls components and component groups.

In LRA Tables 3.6.2-1 through 3.6.2-3, the applicant provided a summary comparison of the Millstone aging management activities with the aging management activities evaluated in NUREG-1801 for the electrical component groups Cables and Connectors, Electrical Penetrations and Bus Duct. In these tables, the applicant also provided a summary of materials of construction, service environments, aging effects requiring management, and credited aging management program for each electrical component group.

The applicant's AMRs incorporated applicable operating experience in the determination of AERMs. These reviews included evaluation of plant-specific and industry operating experience. The plant-specific evaluation included reviews of condition reports and discussions with appropriate site personnel to identify AERMs. The applicant's review of industry operating experience included a review of the GALL Report and operating experience issues identified since the issuance of the GALL Report.

3.6.2 Staff Evaluation

The staff reviewed LRA Section 3.6 to determine if the applicant provided sufficient information to demonstrate that the effects of aging for the electrical and instrumentation and controls system components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Also, the staff performed an onsite audit of AMRs to confirm the applicant's claim that certain identified AMRs were consistent with the GALL Report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL AMPs. The staff's evaluations of the AMPs are documented in Section 3.0.3 of this SER. Details of the staff's audit evaluation are documented in the staff's MPS audit and review report and summarized in Section 3.6.2.1 of this SER.

The staff also performed an onsite audit of those AMRs that were consistent with the GALL Report and for which further evaluation is recommended. During the audit, the staff verified that the applicant's further evaluations were consistent with the acceptance criteria in Section 3.6.2.2 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.6.2.2 of this SER.

The staff performed an onsite audit and conducted a technical review of the remaining AMRs that were not consistent with or not addressed in the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the staff's MPS audit and review report and summarized in Section 3.6.2.3 of this SER. The staff's evaluation of its technical review is also documented in Section 3.6.2.3 of this SER.

Finally, the staff reviewed the AMP summary descriptions in the FSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the electrical and instrumentation and controls system components.

Table 3.6-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.6 that are addressed in the GALL Report.

Table 3.6-1 Staff Evaluation for Electrical and Instrumentation and Controls in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Electrical equipment subject to10 CFR 50.49 EQ requirements (Item Number 3.6.1-01)	Degradation due to various aging mechanisms	Environmental qualification of electrical components	TLAA	This TLAA is evaluated in Section 4.4.
Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements (Item Number 3.6.1-02)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced IR; electrical failure caused by thermal/ thermoxidative degradation of organics, radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	Aging management program for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	Electrical cables and connectors not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.8)	Consistent with GALL, which recommends no further evaluation (See Section 3.6.2.1)
Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance (Item Number 3.6.1-03)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced IR; electrical failure caused by thermal/ thermoxidative degradation of organics; radiation-induced oxidation; moisture intrusion	Aging management programs for electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements	Electrical cables not subject to 10 CFR 50.49 environmental qualification requirements used in instrumentation circuits (B2.1.9)	Consistent with GALL, which recommends no further evaluation (See Section 3.6.2.1)
Inaccessible medium-voltage (2 kV to 15 kV) cables not subject to 10 CFR 50.49 EQ requirements (Item Number 3.6.1-04)	Formation of water trees; localized damage leading to electrical failure (breakdown of insulation) caused by moisture intrusion and water trees	Aging management program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	Inaccessible medium-voltage cables not subject to 10 CFR 50.49 environmental qualification requirements (B2.1.14)	Consistent with GALL, which recommends no further evaluation (See Section 3.6.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Electrical connectors not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage (Item Number 3.6.1-05)	Corrosion of connector contact surfaces caused by intrusion of borated water	Boric acid corrosion		Not applicable (See Section 3.6.2.1)

The staff's review of the MPS electrical and instrumentation and controls and associated components followed one of several approaches. One approach, documented in Section 3.6.2.1, involves the staff's review of the AMR results for components in the electrical and instrumentation and controls that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in Section 3.6.2.2, involves the staff's review of the AMR results for components in the electrical and instrumentation and controls that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in Section 3.6.2.3, involves the staff's review of the AMR results for components in the electrical and instrumentation and controls that the applicant indicated are not consistent with the GALL Report or are not addressed in the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the electrical and instrumentation and controls components is documented in Section 3.0.3 of this SER.

3.6.2.1 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In Section 3.6.2.1 of the LRA, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage aging effects related to the electrical and instrumentation and control components:

- Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program
- Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

Staff Evaluation. In LRA Tables 3.6.2-1 through 3.6.2-3, the applicant provided a summary of AMRs for the electrical and instrumentation and control components and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

Note B indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified that the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note C indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified by the GALL Report. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect, and AMP as the component that was under review. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the AMR line item of the different component was applicable to the component under review and whether the AMR was valid for the site-specific conditions.

Note D indicated that the component for the AMR line item is different from, but consistent with the GALL Report for material, environment, and aging effect. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report. The staff verified whether the AMR line item of the different component was applicable to the component under review. The staff verified whether the identified exceptions to the GALL AMPs had been reviewed and accepted by the staff. The staff also determined whether the AMP identified by the applicant was consistent with the AMP identified in the GALL Report and whether the AMR was valid for the site-specific conditions.

Note E indicated that the AMR line item is consistent with the GALL Report for material, environment, and aging effect, but a different aging management program is credited. The staff audited these line items to verify consistency with the GALL Report. The staff also determined whether the identified AMP would manage the aging effect consistent with the AMP identified by the GALL Report and whether the AMR was valid for the site-specific conditions.

The staff conducted an audit and review of the information provided in the LRA, as documented in its MPS audit and review report. The staff did not repeat its review of the matters described in the GALL Report. However, the staff did verify that the material presented in the LRA was applicable and that the applicant had identified the appropriate GALL Report AMRs. The staff evaluation is discussed below.

Conclusion. The staff has evaluated the applicant's claim of consistency with GALL Report. The staff also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects. On the basis of its review, the staff finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the staff finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2.2 AMR Results That Are Consistent with the GALL Report, for Which Further Evaluation is Recommended

Summary of Technical Information in the Application. In LRA Section 3.6.2.2, the applicant provided further evaluation of aging management as recommended by the GALL Report for electrical components. The applicant provided information concerning how it will manage the aging effects of electrical equipment subject to environmental qualification.

The applicant stated that environmental qualification is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in LRA Section 4.4, Environmental Qualification of Electric Equipment and LRA Appendix B, Section B3.1, Electrical Equipment Qualification.

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff reviewed the applicant’s evaluation to determine whether it adequately addressed the issues that were further evaluated.

The GALL Report indicates that further evaluation should be performed for the aging effects described in the following sections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

As stated in the SRP-LR, environmental qualification is a TLAA, as defined in 10 CFR 54.3. Applicants must evaluate TLAAs in accordance with 10 CFR 54.21(c)(1). Section 4.4 of this SER documents the staff’s review of the applicant’s evaluation of this TLAA. In performing this review, the staff followed the guidance in Section 4.4 of the SRP-LR.

3.6.2.2.2 Quality Assurance for Aging Management of Non-Safety-Related Components

Section 3.0.4 of this SER provides the staff’s evaluation of the applicant’s quality assurance program.

Conclusion. On the basis of its review, for component groups evaluated in the GALL Report for which the applicant has claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff determines that (1) those attributes or features for which the applicant claimed consistency with the GALL Report were indeed consistent and

(2) the applicant adequately addressed the issues that were further evaluated. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2.3 AMR Results That Are Not Consistent With or are Not Addressed in the GALL Report

Summary of Technical Information in the Application. The applicant did not address the AMR results of electrical components which are not addressed in the GALL Report.

Staff Evaluation. For component type, material and environment combination that are not evaluated in the GALL Report, the staff reviewed the applicant's evaluation to determine whether the applicant had demonstrated that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB during the period of extended operation.

The applicant identified three commodities which indicated would cover all electrical components within the scope of licensee renewal. These commodities were identified as:

(1) Cable and Connectors. In its letter dated November 9, 2004, the applicant confirmed that it treats splices as an integral part of the cable. Non-EQ splices are included in commodity groups “Conductors” and “Insulation” in LRA Table 2.5.1-1 and the aging management review results are included in Table 3.6.2-1. This commodity includes non-EQ cables installed in raw water or damp soil. The staff requested clarification of the statement in the LRA that the thermal exposure of elastomers would remain below 95 °F and therefore would not require an AMP. In its response dated January 11, 2005, the applicant confirmed that the referenced temperature was the ambient temperature and when the effects of ohmic heating on the cable insulation is included, sufficient margin exists below the 60 year analyzed temperature limit for the extended period of operation. Therefore no aging management program is required.

(2) Containment Electrical Penetrations. The staff requested clarification on the following two items.

   1. The LRA stated that the pressure boundary of the electrical containment penetrations contain non-metallic components such as Polysulfone and Vitron. Clarify why there is no aging management program required for those materials that maintain containment integrity or identify the AMP that does cover this function.

   2. The LRA stated that the electrical conduction and insulation functions of the electrical containment penetrations contain electrical connectors, insulation and insulators. Clarify why there is no aging management program required for those materials that maintain electrical conductivity and insulation or identify the AMP that does cover these functions.

   In its response dated November 9, 2004, the applicant stated that the non-EQ penetrations were qualified to the same requirements as the EQ penetrations. The applicant stated the life expectancy of the electrical penetrations exceed 60 years and therefore was not a concern for the extended period of operation.

(3) Bus Duct. The staff requested clarification on two items.

1. The LRA did not address an aging management program for the high-voltage cables and connectors from the portions of the 345 kV switchyard to the reserve station service transformer (RSST) and the medium-voltage cables (including any cable bus or bus duct) and connectors from the RSST to the Class 1E switchgear that are used to recover offsite power following a station blackout (SBO).
2. The applicant responded in its response dated December 3, 2004, that the SBO path within the scope of licensee renewal included the 345 kV switchyard and the high-voltage bus from the switchyard to the RSSTs. The applicant also stated that the aluminum conductor steel reinforced (ACSR) high-voltage conductor and the tubular aluminum high-voltage bus were not insulated and experience has demonstrated no corrosion of the conductors that could cause a loss of intended function.

The applicant stated in its response dated December 3, 2004, that the medium-voltage connection from the Unit 2 RSST to the safety-related bus was by cable and the connection from the Unit 3 RSST to the safety-related bus was by cable and bus duct.

The staff review of the SBO path for license renewal is documented below in three parts in the following sections.

- high voltage insulators (Section 3.6.2.3.2)
- non-segregated bus duct (Section 3.6.2.3.3)
- switchyard bus (Section 3.6.2.3.4)

3.6.2.3.1 Electrical Connectors not Subject to 10 CFR 50.49 EQ Requirements That Are Exposed to Borated Water Leakage

Summary of Technical Information in the Application. The applicant identified the following aging effects associated with electrical components subjected to exposure to borated water require management:

- reduced insulation resistance caused by corrosion.
- loss of material caused by corrosion.

In LRA Table 3.6.1, “Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801,” the applicant indicated in item 3.6.1-05 that the borated water leakage environment was considered for electrical connectors. However, connectors at Millstone are protected from borated water leakage by their location within protective enclosures and by design features which seal the enclosures along with associated conduit and cable entrances and corrosion of connector contact surfaces caused by intrusion of borated water is not an aging effect requiring management.

In LRA Table 3.6.1, “Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801," the applicant stated that an aging management program was not required.

In LRA Section B2.1.3, “Boric Acid Corrosion,” the applicant stated that the Millstone boric acid corrosion program addresses industry experience in response to Nuclear Regulatory Commission (NRC) Generic Letter (GL) 88-05 and Bulletins 2002-01 and 2002-02. The Millstone boric acid corrosion program manages loss of material in areas where there are carbon steel and low-alloy steel structures or components on which borated reactor water might leak.

Staff Evaluation. The staff agreed that LRA correctly identified the aging effects associated with electrical components exposed to boric acid. The staff also agreed that there is no need for an aging management program for electrical connections exposed to borated water because the design at Millstone inhibits the ingress of borated water into electrical connections and the boric acid corrosion program will address any observed borated water leakage.

The staff concluded that the applicant adequately addressed the aging threat to electrical connections from borated water by design of the connection enclosures supplemented by their borated water leakage assessment program and no separate aging management program for connectors exposed to borated water was required.

3.6.2.3.2 High Voltage Insulators

Summary of Technical Information in the Application. Section 2.1.3.7.5, Station Blackout, includes the following components in scope for offsite power restoration following a SBO: 1) the 345 kV bus to the RSST and the associated disconnect switch, 2) the overhead conductors from the Connecticut Light & Power (CL&P) switchyard, 3) the North Bus (Unit 2), the South Bus (Unit 3) and their associated disconnect switches, and 4) the support structures associated with these in-scope components. Section 2.5.3, Bus Ducts, describes the high-voltage bus duct connection between the switchyard and the RSST and identifies the high-voltage insulators non-porous translucent porcelain ceramic covered with an oven-baked glaze. The high-voltage insulators are used to insulate the high-voltage components (cable and bus) from the grounded support structures. No aging effects were discussed.

Table 2.5.3-1, Bus Duct, lists bus support insulator as part of the commodity group with an intended function to insulate and provide structural support. Table 3.6.2-3, Electrical Components - Bus Duct - Aging Management Evaluation, indicates there is no aging effect requiring management for the bus support insulator. In Table 3.6.2-3, Electrical Components - Bus Duct - Aging Management Evaluation, the applicant stated that there was no aging management program for bus support insulators of porcelain material because there was no aging effect that required management.

Staff Evaluation. In Table 3.6.2-3, Electrical Components - Bus Duct - Aging Management Evaluation, the applicant stated that there was no aging effect that required management.

The staff concluded that the applicant adequately addressed the aging management for high-voltage insulators and agreed that no aging management program was required for high-voltage insulators.

3.6.2.3.3 Non-segregated Bus Duct

Summary of Technical Information in the Application. Section 2.1.3.7.5, Station Blackout, includes the bus duct from the RSST to the safety-related buses in-scope for license renewal. Section 2.5.3, Bus Duct, describes the high-voltage bus duct connection between (1) the switchyard and the RSST and (2) the medium-voltage non-segregated bus duct from the RSST to the safety buses. No aging effects were discussed.

Table 2.5.3-1, Bus Duct, fails to include any description for the medium-voltage bus duct components.

Table 3.6.2-3, Electrical Components - Bus Duct - Aging Management Evaluation, identifies the insulation system material for the (medium-voltage non-segregated) bus duct conductors in Unit 3 as Noryl. (Noryl is the General Electric trademark name for a plastic type electrical insulation material.) The table indicates there is no aging effect requiring management for the Noryl insulating material.

In its response to RAI 3.6-2 dated December 3, 2004, the applicant stated that there were no bus ducts between the RSST and the safety-related buses in Unit 2. For Unit 3, round, aluminum bus ducts are located outdoors between the RSST and the service building wall penetration. Inside the service building, the bus ducts are bolted, insulated aluminum bus bar. The applicant's letter indicated the bus ducts were normally loaded to 67 percent of their rating so that thermal cycling would be minimum and splice bolting torque relaxation is not expected to occur.

However, the Millstone-3 FSAR, Section 8.3.1.1.2, Class 1E AC Power, states:

> During normal operation, power is supplied through the normal station service transformer A from the unit generator via the isolated phase bus duct, with the generator breaker closed,. normal station service transformer A supplies power to emergency 4.16 kV buses 34C (Train A) and 34D (Train B), via normal buses 34A and 34B, respectively.
>
> In the event of loss of the normal offsite power source, the alternate offsite power source supplies power through the reserve station service transformer A from the 345 kV switchyard. reserve station service transformer A supplies power to emergency 4.16 kV buses 34C (Train A) and 34D (Train B).

The applicant stated that no AMP is required for the bus ducts in the SBO recovery path because the bus has no aging effects requiring management.

Staff Evaluation. In its response dated December 3, 2004, to RAI 3.6-2, the applicant stated that, for Unit 3, round, aluminum bus ducts are located outdoors between the RSST and the building wall penetration, are welded, non-ventilated with no joints or fasteners. Inside the service building, the bus ducts are bolted, insulated aluminum bus bar and are vented by means of down-turned elbow fittings with screens. The LRA identifies the insulating material used on the Unit 3 medium-voltage, non-segregated bus duct in the service building as Noryl. Industry experience has identified an aging effect for Noryl-insulated, non-segregated bus duct as insulation cracking.

Aging effects for the non-segregated phase bus ducts requiring evaluation are those associated with moisture/debris intrusion and bolt loosening due to thermal cycling.

The bus ducts are located both inside and outside. Bus duct enclosures located outside are non-vented. The vented bus duct does not provide protection for moisture.

Entry of debris into the vented bus duct is restricted by down-turned elbow fittings with screens. Therefore, debris intrusion is not an aging effect requiring management. The metal bus duct enclosures provide protection for the enclosed bus duct against weather and debris.

Industry experience has shown that bus ducts exposed to appreciable ohmic or ambient heating during operation may experience loosening of bolted connections related to the repeated cycling of connected loads or the ambient temperature environment. This phenomenon can occur in heavily loaded circuits (i.e., those exposed to appreciable ohmic heating or ambient heating) that are routinely cycled. The Millstone FSAR indicates that the normal path for power to the safety-related buses is from the NSST. The bus duct from the RSST to the safety-related bus is not normally loaded. Therefore it appears that the bus duct is normally not loaded and may be subject to thermal cycling.

Industry operating experience was reviewed for problems associated with bus ducts. The following items were selected for further review and dispositioned:

In its response the applicant also indicated that the following generic communication were reviewed as part of its aging management review and determined to be not applicable to Millstone Unit 3.

- Information Notice 89-64, "Electrical Bus Bar Failures," was issued to address Noryl-insulated medium-voltage bus bar failures that occurred at several nuclear facilities. The failures identified in Information Notice 89-64 were attributed to cracking of the Noryl bus bar insulation in combination with the accumulation of moisture or debris in the bus duct housings that provided a tracking path to ground.
- Information Notice 98-36, "Inadequate or Poorly Controlled, Non-Safety Related Maintenance Activities Unnecessarily Challenged Safety Systems," notified licensees of various inadequate maintenance activities (e.g., failure to install gaskets or caulking of outdoor components) in the industry which resulted in moisture intrusion and challenges to safety-related systems.
- Information Notice 2000-14, "Non-Vital Bus fault Leads to Fire and Loss of Offsite Power," informed licensees of a transient at Diablo Canyon nuclear plant caused by a failure of a bus bar due to overheating at a splice joint. Potential causes of the failure include inconsistent silver plating of aluminum bus bars, currents approaching bus capacity, undersized splice plates, torque relaxation of connecting bolts, and undetected damage from a 1995 explosion of Auxiliary Transformer 1-1.

Non-segregated phase bus duct is characterized as all three phases contained in a single enclosure. This could be exposed conductors (ie. tube, bar, channel, etc.) insulated from the enclosure or it could be insulated cable. The problems documented in Information Notices 89-64, 98-36, and 2000-14, apply to bus duct with exposed bar conductors. The failure mechanisms identified in Information Notices 89-64 and 98-36 are not applicable to Millstone 2 because Unit 2 does not have bus ducts with exposed conductors.

Some of the potential causes of the bus bar failure addressed in Information Notice 2000-14 could apply to other types of bus duct designs. These mechanisms include currents approaching bus capacity and torque relaxation of connecting bolts. The Millstone non-segregated phase bus ducts are designed to carry the output of the start-up auxiliary transformers. The worst-case loading on any portion of the cable bus duct for either unit is approximately 67 percent. No description of the connections from bus to equipment was provided. Therefore, currents approaching bus capacity and torque relaxation have not been ruled out as an aging mechanisms for the non-segregated phase bus ducts at Millstone.

In its response dated February 8, 2005, the applicant indicated that a review conducted by an independent consultant concluded that the aging of the specific Noryl compound used in at Millstone would not degrade over the period of extended operation. The same response also indicated that the bolted connections were joined using Bellville spring washers that would further reduce the probability of torque relaxation from thermal cycling.

The staff agrees that the LRA, together with the supplement information in the responses dated December 3, 2004, and February 8, 2005, adequately identified the aging effects associated with metal-enclosed (non-segregated) bus ducts.

The staff concluded that the applicant adequately addressed the aging effects for Noryl-insulated, non-segregated bus duct in Unit 3 and adequately documented its conclusion that no separate aging management program for non-segregated bus duct was required.

3.6.2.3.4 Switchyard Bus

Summary of Technical Information in the Application. Section 2.1.3.7.5, Station Blackout, includes the following components within the scope of license renewal for offsite power restoration following a SBO: (1) the 345 kV bus to the RSST and the associated disconnect switch, (2) the overhead conductors from the CL&P switchyard, (3) the Switchyard North Bus (Unit 2), the Switchyard South Bus (Unit 3), and their associated disconnect switches, and (4) the support structures associated with these in-scope components. Section 2.5.3, Bus Ducts, describes the high-voltage switchyard bus as tubular conductors.

Table 2.5.3-1, Bus Duct, includes a description for bus duct and identifies the intended function for the bus duct (conductors) to conduct electricity. The table does not differentiate between the high-voltage switchyard bus duct and medium-voltage bus duct.

Table 3.6.2-3, Electrical Components - Bus Duct - Aging Management Evaluation, identifies the high-voltage bus duct and switchyard bus components as metal conductors with porcelain insulators. The table indicates that there are no components with aging effects that require management and no aging management programs were identified.

Staff Evaluation. The high-voltage switchyard buses are composed of bare aluminum tubes. The staff agrees that there is no aging effect that requires management. Based on the tube materials used in the high-voltage switchyard buses, the staff also agrees that no aging management program for high-voltage switchyard bus was required.

1.7The staff concludes that the applicant adequately addressed the aging effects for high-voltage switchyard bus and concludes that no separate aging management program for high-voltage switchyard bus was required.

Conclusion. On the basis of its review, the staff finds that the applicant appropriately evaluated AMR results involving material, environment, aging effect requiring management, and AMP combinations that are not evaluated in the GALL Report or not addressed in the GALL Report. The staff finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the AMR results, the staff concludes that actions have been identified and have been or will be taken to manage the effects of aging during the period of extended operation on the functionality of structures and components subject to an AMR such that there is reasonable assurance that the activities authorized by a renewed license will continue to be conducted in accordance with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

3.6.3 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated that the aging effects associated with the electrical and instrumentation and controls systems components will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable FSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the electrical and instrumentation and controls systems, as required by 10 CFR 54.21(d).

3.7 Conclusion for Aging Management

The staff has reviewed the information in LRA Section 3, “Aging Management Review Results,” and Appendix B, “Aging Management Programs and Activities.” On the basis of its review of the AMR results and AMPs, the staff concludes that the applicant has demonstrated that the aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicable FSAR supplement program summaries and concludes that the FSAR supplement adequately describes the AMPs credited for managing aging as required by 10 CFR 54.21(d).

With regard to these matters, the NRC staff has concluded that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis, and that any changes made to the MPS current licensing basis in order to comply with 10 CFR 54.21(a)(3) are in accord with the Atomic Energy Act of 1954, as amended, and NRC regulations.

SECTION 4

TIME-LIMITED AGING ANALYSES

4.1 Identification of Time-Limited Aging Analyses

This section addresses the identification of time-limited aging analyses (TLAAs). Dominion Nuclear Connecticut, Inc. (Dominion or the applicant) discusses the TLAAs in Sections 4.2 through 4.7 of its license renewal applications (LRAs). Sections 4.2 through 4.8 of this safety evaluation report (SER) document the review of the TLAAs conducted by the staff of the U.S. Nuclear Regulatory Commission (NRC or the staff).

The TLAAs are certain plant-specific safety analyses that are based on an explicitly assumed 40-year plant life. Pursuant to Title 10, Section 54.21(c)(1), of the *Code of Federal Regulations* [10 CFR 54.21(c)(1)], the applicant for license renewal must provide a list of TLAAs, as defined in 10 CFR 54.3.

In addition, pursuant to 10 CFR 54.21(c)(2), an applicant must provide a list of plant-specific exemptions granted under 10 CFR 50.12 that are based on TLAAs. For any such exemptions, the applicant must provide an evaluation that justifies the continuation of the exemptions for the period of extended operation.

4.1.1 Summary of Technical Information in the Application

To identify the TLAAs, the applicant evaluated calculations for the Millstone Power Station (MPS) against the six criteria specified in 10 CFR 54.3. The applicant indicated that it had identified the calculations that met the six criteria by searching the current licensing basis (CLB). The CLB includes the final safety analysis report (FSAR), engineering calculations, technical reports, engineering work requests, licensing correspondence, and applicable vendor reports. The applicant listed the following applicable TLAAs in LRA Table 4.1-1, “Time-Limited Aging Analysis Categories:”

- reactor vessel neutron embrittlement
- metal fatigue
- environmental qualification (EQ) of electrical equipment
- concrete containment tendon prestress
- containment liner plate and penetrations
- crane load cycle limit
- reactor coolant pump flywheel
- reactor coolant pump Code Case N–481
- leak before break

Pursuant to 10 CFR 54.21(c)(2), the applicant stated that it did not identify any exemptions granted under 10 CFR 50.12 that were based on a TLAA, as defined in 10 CFR 54.3.

4.1.2 Staff Evaluation

In Section 4.1 of each LRA, the applicant identified the TLAAs applicable to MPS. The staff reviewed the information to determine whether the applicant had provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).

As defined in 10 CFR 54.3, TLAAs are analyses that meet the following six criteria:

(1) involve systems, structures, and components within the scope of license renewal, as delineated in 10 CFR 54.4(a)

(2) consider the effects of aging

(3) involve time-limited assumptions defined by the current operating term (40 years)

(4) are determined to be relevant by the applicant in making a safety determination

(5) involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b)

(6) are contained or incorporated by reference in the current licensing basis

The applicant provided a list of common TLAAs from NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plant,” dated July 2001. The applicant listed those TLAAs that are applicable to MPS in each Table 4.1-2 of the LRAs, which provided a comparison to TLAAs from NUREG-1800.

As required by 10 CFR 54.21(c)(2), an applicant must provide a list of all exemptions granted under 10 CFR 50.12 that are based on a TLAA and evaluated and justified for continuation through the period of extended operation. In its LRA, the applicant stated that each active exemption was reviewed to determine whether the exemption was based on a TLAA. The applicant did not identify any TLAA-based exemptions. On the basis of the information provided by the applicant with regard to the process used to identify TLAA-based exemptions, as well as the results of the applicant’s search, the staff finds that the applicant identified no TLAA-based exemptions that are justified for continuation through the period of extended operation, in accordance with 10 CFR 54.21(c)(2).

4.1.3 Conclusion

On the basis of its review, the staff concludes that the applicant has provided an acceptable list of TLAAs, as required by 10 CFR 54.21(c)(1), and has confirmed that no exemptions to 10 CFR 50.12 have been granted on the basis of a TLAA, as required by 10 CFR 54.21(c)(2).

4.2 Reactor Vessel Neutron Embrittlement

The NRC uses two parameters as a measure of the fracture toughness of ferritic steels (i.e., either carbon steel or low-alloy steel) used to fabricate the reactor vessels (RVs) in light-water reactors:

- a reference temperature for nil-ductility transition (RT_{NDT}), which is a measure of the material's ability to resist cleavage failure, and
- the upper-shelf energy (USE) value for the material, which is a measure of the material's ability to resist ductile failure.

During plant service, neutron radiation reduces the fracture toughness of the RV materials by causing the RT_{NDT} to increase and the USE to decrease. The base metal materials and weld materials in the region of the vessel immediately adjacent to the reactor core (i.e., in the beltline region of the RV) are most susceptible to these effects because they are exposed to neutron fluences in excess of 1.0×10^{17} neutrons/cm^2 (1.0×10^{17} n/cm^2)(E>1.0 MeV).

The staff performs the following three reviews to ensure that the beltline materials in PWR RVs have adequate fracture toughness during normal and off-normal operating conditions:

(1) assessments for pressurized thermal shock (PTS), as required by 10 CFR 50.61

(2) assessments for calculating the pressure-temperature (P-T) limit curves for heatups, cooldowns, and pressure tests of the RVs, as required by 10 CFR Part 50, Appendix G, Section IV.A.2

(3) assessments for USE, as required by 10 CFR Part 50, Appendix G, Section IV.A.1.

Since these assessments are related to the amount of neutron radiation absorbed over time, they must be treated as TLAAs for the materials in the beltline of the RV. The staff evaluates these TLAAs in the following subsections to SER Chapter 4.2:

- SER Section 4.2.2 – TLAA for USE (the analogous LRA section is LRA Section 4.2.2)
- SER Section 4.2.3 – TLAA for PTS (the analogous LRA section is LRA Section 4.2.3)
- SER Section 4.2.4 – TLAA for calculation of the P-T limit curves (the analogous LRA section is LRA Section 4.2.4)

Section 4.2.1 of the LRA for Millstone Units 2 and 3 describes the neutron fluence calculations to support the above TLAAs for USE, PTS, and P-T limit curves. Therefore, the neutron fluence calculations will be evaluated in Section 4.2.1 of this SER in order to support the evaluation of the above TLAAs.

4.2.1 Neutron Fluence

4.2.1.1 Summary of Technical Information in the Application

In Section 4.2.1 of the LRA for Millstone Unit 2, the applicant summarizes the analytical evaluation of the neutron fluence calculations for the period of extended operation. In this section of the LRA, the applicant provided the following assessment for the neutron fluence calculations and the fluence values (Table 4.2-1 and 4.2-2 of the LRA) through the period of extended operation:

> The analytical calculation of the space and energy dependent neutron flux in the reactor vessel is performed with the two-dimensional discrete ordinates transport code DOTIV, (Reference 4.8-42). The calculations employ an angular quadrature of 48 sectors (S8), a third-order LeGendre [Legendre] polynomial scattering approximation (P3), the BUGLE cross section set (Reference 4.8-43) with 47 neutron energy groups, and a fixed distribution source corresponding to the time weighted average power distribution for the applicable irradiation period.
>
> The transition temperature shift for the base metal employing the neutron flux calculated using this methodology is in good agreement with the predicted value employing Regulatory Guide 1.99, Revision 2 guidance. The transition temperature shift for the weld metal employing the 4 neutron flux calculated using this methodology is conservative compared with the predicted shift using Regulatory Guide 1.99, Revision 2 guidance (Reference 4.8-44).

For Millstone Unit 3, the description of the neutron fluence evaluation in the LRA is limited to the statement that the neutron fluence is calculated using a discrete-ordinates transport method consistent with draft NRC Regulatory Guide (DG)-1053. The neutron fluence values were provided in Tables 4.2-1 and 4.2-2 of the Millstone Unit 3 LRA.

In LRA Section 4.2.1 for Unit 2, the applicant stated that the analytical calculation of the space and energy-dependent neutron flux in the reactor vessel is performed with the two-dimensional discrete ordinates transport code DOT-IV. The calculations employ an angular quadrature of 48 sectors (S8), a third-order LeGendre polynomial scattering approximation (P3), the BUGLE cross-section set with 47 neutron energy groups, and a fixed distribution source corresponding to the time-weighted average power distribution for the applicable irradiation period.

4.2.1.2 Staff Evaluation

The staff issued RG 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” in March 2001. The RG provides guidance regarding acceptable methods for the benchmarking of RV fluence methodologies based on the requirements of General Design Criterion (GDC) 31 and, in part, on GDC 14 and 30. Therefore, the staff based its review of the RV fluence evaluation for Millstone Units 2 and 3 on the adherence of the calculational method to the guidance in RG 1.190.

To evaluate the fluence values for Millstone Unit 2, the staff requested the applicant to specify whether the fluence calculations met the guidance in RG 1.190. In addition, several other requests for additional information were asked, such as the derivation of the neutron sources, what assumption were made for core loading, and the consideration of the effect of plutonium in the calculations. These requests were identified by the staff as RAI 4.2.1-1(a) through (e).

In response to RAI 4.2.1-1(a) through (e), the applicant stated that the methodology used for the calculation of the vessel neutron fluence to the end of the renewed license (54 effective full-power years (EFPYs) of operation) does not fully conform to the guidance in RG 1.190. In addition, the transport cross sections are derived from the ENDF/B-IV file, which is not allowed in RG 1.190. Although the methodology does not meet the guidance of RG 1.190, the applicant stated that the fluence calculation is sufficiently documented to determine the impact of neutron fluence on radiation embrittlement.

In Table 4.2-2 of the submittal, the applicant indicated that for RT_{PTS} the critical element is the Lower Shell Plate C-506-1 with an estimated RT_{PTS} equal to 190.5 °F at 54 EFPYs and a peak inside surface fluence of 4.05×10^{19} n/cm^2 (E > 1.0 MeV). The staff has concluded from experience that fluence values calculated using methods not in compliance with the guidance in RG 1.190 could differ by as much as 40 percent from fluence values calculated by methods that adhere to RG 1.190 guidance. Assuming that the above fluence value is underestimated by 40 percent, the value would be 5.67×10^{19} n/cm^2. Using equation 2 in RG 1.99 with the chemistry factor (CF) of 110 °F and an initial RT_{NDT} value of 7.0 °F from Table 4.2-2, the RT_{PTS} is equal to 197.9 °F. This value is well within the screening criterion of 270 °F of 10 CFR 50.61. Therefore, the staff concludes that the material properties are well within the safety limits. Similar results are obtained with the USE and are discussed in Section 4.2.2.2 of this SER.

However, the applicant is planning to submit pressure-temperature (P-T) limit curves for 54 EFPYs at least two years prior to the period of extended operation. In response to RAI 4.2.1-3, the applicant stated that the FSAR supplement will be modified to reflect revised vessel fluence methodologies that follow the guidance in RG 1.190. (See Section 4.2.1.3 of this SER.) This resolves RAI 4.2.1-1(a) through (e).

In addition, the staff requested the applicant to confirm that the neutron fluence methodology used for Millstone Unit 3 adheres to the guidance of RG 1.190. Several other requests for additional information were made by the staff to evaluate the fluence calculations, such as what approximations were used, what assumptions regarding fuel loading were made, and what consideration of plutonium was made in the fluence calculations. These requests were identified by the staff as RAI 4.2.1-2(a) through (e).

In its response to RAI 4.2.1-2(a) through (e), the applicant stated that the vessel fluence for Unit 3 was calculated using a discrete ordinates method using DOORS 3.1, "RSICC Computer Code Collection CCC-650, "DOORS 3.1, Two- and Three-Dimensional Discrete Ordinates Neutron/Photon Transport Code System," dated August, 1996, which followed the guidance in RG 1.190. Specifically, the transport cross sections were derived from BUGLE-96, RSICC Data Library Collection DLC-185 "BUGLE-96 Coupled 47 Neutron, 20 Gamma-Ray Group Cross Section Library Derived from ENDF/B-VI for LWR Shielding and Pressure Vessel Dosimetry Applications," dated March, 1996, which is based on the ENDF/B-VI file recommended in RG 1.190. Similarly, the anisotropic scattering was approximated with a P_3 LeGendre expansion polynomial and the angular discretization with a S_8 order of angular quadrature. Energy- and space-dependent power distributions were derived from cycle-specific calculations. Projections to 54 EFPYs were based on the low leakage loadings for cycles four to six. The burnup dependent effects of the neutron source account for the spatial variation of the neutron source as well as the spectral effects introduced by the derivative fissioning isotopes of Pu-239 and Pu-241. In summary, the staff finds that the proposed value of the vessel fluence in Table 4.2-1 for 54 EFPYs for E > 1.0 MeV is acceptable because the methodology follows the guidance in RG 1.190. This resolves RAI 4.2.1-2(a) through (e).

4.2.1.3 FSAR Supplement

The staff recognizes that the applicant calculated fluence values to 54 EFPYs (i.e., the end of the period of extended operation) in each LRA Section 4.2.1, which contains the evaluations of TLAAs. However, the applicant did not specifically state that the calculations for neutron fluence values are TLAAs. The staff considers that the calculations for neutron fluence values meet the requirements of 10 CFR 54.3, in that they use time-limiting assumptions. Also, the operating assumptions in these calculations could change, as for example, with the introduction of new fuel, new material properties, etc. In such an instance, 10 CFR 50.61 and other regulations require recalculation of the fluence and reevaluation of the material properties. Pursuant to 10 CFR Part 54.21(d), the Millstone FSAR supplement for a facility LRA must contain a summary description for each AMP and TLAA proposed for management of the effects of aging. The staff determined that Appendix A of the LRAs (the FSAR supplement) did not include a corresponding FSAR supplement summary description for the TLAA in Section 4.2.1, “Neutron Fluence,” of the LRAs. Therefore it is necessary to capture this information in the FSAR supplements. Pursuant to 10 CFR 54.21(d), the staff requested that a corresponding FSAR supplement summary description for each LRA Section 4.2.1 be included in the FSAR supplements. This request was identified by the staff as RAI 4.2.1-3.

In response to RAI 4.2.1-3, in a letter dated December 3, 2004, the applicant updated Section A3.1.3 of the Millstone Units 2 and 3, FSAR supplements to incorporate a summary description on the current methodology of calculating neutron fluence and the use of RG 1.190 in developing fluence values for the period of extended operation. This includes a statement in the proposed FSAR supplements that when developing the Millstone Units 2 and 3 P-T limit curves for the period of extended operation, fluence values will be developed in accordance with RG 1.190 requirements. Millstone Unit 3 uses a fluence methodology in accordance with DG-1053, and the specific methodology applied to the calculation followed the guidance of RG 1.190. DG-1053 is the draft version of RG 1.190 and provides similar conservatism when calculating the reactor vessel fluence values. Therefore for Millstone Unit 3, the fluence values meet the guidelines of RG 1.190 and are acceptable to the staff.

However, Millstone Unit 2 does not use a fluence methodology in accordance with RG 1.190, and therefore the methodology may be less conservative. The staff has concluded from experience that fluence values calculated using methods not in compliance with the guidance in RG 1.190 could differ by as much as 40 percent from fluence values calculated by methods that adhere to RG 1.190 guidance. Since the applicant will be providing new P-T limit curves for 54 EFPY, the staff requested that the applicant commit to submit the reactor vessel fluence calculations using a methodology in accordance with RG 1.190, which will also support the P-T limit curve submittal, to the NRC along with the 54 EFPY P-T limit curves in 2005. The applicant needed to add to its list of commitments the submittal of a re-evaluation of the USE and RT_{PTS} to update the licensing basis to be consistent with the fluence values used in the P-T limit curves.

In response to supplemental RAI 4.2.1-3 in a letter dated February 8, 2005, the applicant committed to update the USE, RT_{PTS} and P-T limit curves based on fluence values developed in accordance with RG 1.190 requirements, through the period of extended operation. The applicant will provide these updated evaluations at least two years prior to the period of extended operation and is documented as Commitment Item 37 in the Millstone Unit 2 FSAR supplement, Appendix A, Table A6.0-1. This resolves RAI 4.2.1-3.

4.2.1.4 Conclusion

The staff has reviewed the applicant's evaluation on neutron fluence, as summarized in Section 4.2.1 of the LRAs, and has determined that the applicant's calculation of the neutron fluence values, as projected through the expiration of the periods of extended operation for the Millstone units, is acceptable to use in the evaluation of the TLAAs for the USE, PTS, and P-T limit curves. The neutron fluence values are acceptable because Millstone Unit 3 meets the guidelines of RG 1.190, and because the staff added a conservative factor to the Millstone Unit 2 methodology based on past evaluations. The staff also concludes that the Millstone FSAR supplements contain appropriate summary descriptions of the TLAA on neutron fluence for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.2 Upper-Shelf Energy

4.2.2.1 Summary of Technical Information in the Application

In each LRA Section 4.2.2, the applicant summarizes the requirements of 10 CFR Part 50, Appendix G, for end-of-license USE values and identifies that the calculation of the USE values is a TLAA for the applications. In this section of the LRAs, the applicant provided the following assessment for the USE values through the expiration of the periods of extended operation for the units:

> Upper shelf energy values have been calculated per 10 CFR 50.61 using the most recent reactor pressure vessel material property information, including the best estimate copper and nickel values for each of the beltline plates and welds, unirradiated drop weight and Charpy data, and reactor vessel surveillance capsule examination results. This information, developed for 32 effective full power years (EFPY), was used in part to respond to NRC Generic Letter 92-01 Revision 1, Supplement 1 which requested that addressees identify, collect and report any new information pertaining to the analysis of reactor vessel structural integrity. Thirty-two EFPY would be reached at the end of the currently licensed 40-year period of operation assuming a capacity factor of 80%. Similarly, 54 EFPY would be reached at the end of the period of extended operation (60 years) assuming a capacity factor of 90%. The calculated upper shelf energy values were then used in conjunction with NRC RG 1.99, Revision 2 requirements to predict those material changes due to irradiation.
>
> The 54 EFPY upper shelf energy values for the reactor pressure vessel beltline materials were calculated using Figure 2 in RG 1.99, Revision 2, Position 1. Capsule data has been considered and determined to result in values less conservative than obtained from using RG 1.99, Revision 2, Position 1. As shown in Table 4.2-1, acceptable upper shelf energy values have been demonstrated for reactor pressure vessel beltline plate and weld materials through the 54 EFPY period of extended operation. Since all reactor pressure vessel beltline plate and weld materials have upper shelf energy values greater than 50 ft-lbs, no equivalent margins analysis was performed.

> Acceptable upper shelf energy values have been calculated in accordance with Regulatory Guide 1.99, Revision 2 to the end of the period of extended operation per 10 CFR 54.21(c)(1)(ii). Calculated upper shelf energy values for the most limiting reactor pressure vessel beltline plate and weld materials remain greater than 50 ft-lbs.

In each LRA Section 4.2.2, the applicant described the screening criteria that establish limits on how far the USE values for a reactor pressure vessel (RPV) material may be allowed to drop due to neutron radiation exposure. The applicant stated that regulation 10 CFR Part 50, Appendix G, Section IV.A.1 requires the initial USE value to be greater than 75 ft-lb in the unirradiated condition and for the value to be greater than 50 ft-lb in the fully irradiated condition as determined by Charpy V-notch specimen testing throughout the licensed life of the plant. USE values of less than 50 ft-lb may be acceptable to the NRC if it can be demonstrated that these lower values will provide margins of safety against brittle fracture equivalent to those required by ASME Section XI, Appendix G.

USE values have been calculated per 10 CFR 50.61 using the most recent RPV material property information, including the best estimate copper and nickel values for each of the beltline plates and welds, unirradiated drop weight and Charpy data, and reactor vessel surveillance capsule examination results.

This information, developed for 32 effective full power years (EFPY), was used in part to respond to NRC Generic Letter (GL) 92-01 Revision 1, Supplement 1, which requested that addressees identify, collect, and report any new information pertaining to the analysis of reactor vessel structural integrity. Thirty-two EFPY would be reached at the end of the currently licensed 40-year period of operation, assuming a capacity factor of 80 percent. Similarly, 54 EFPY would be reached at the end of the period of extended operation (60 years) assuming a capacity factor of 90 percent. The calculated USE values were then used in conjunction with NRC RG 1.99, Revision 2 requirements to predict those material changes due to irradiation.

The 54 EFPY USE values for the RPV beltline materials were calculated using Figure 2 in RG 1.99, Revision 2, Position 1. Capsule data have been considered and determined to result in values less conservative than obtained from using RG 1.99, Revision 2, Position 1. As shown in Table 4.2-1, acceptable USE values have been demonstrated for RPV beltline plate and weld materials through the 54 EFPY period of extended operation. Since all RPV beltline plate and weld materials have USE values greater than 50 ft-lb, no equivalent margins analysis was performed.

A comparison of copper content and initial upper-shelf energy for Millstone Unit 2 beltline materials listed in Table 4.2-1 to the values listed in NRC reactor vessel integrity database (RVID2 version 2.0.5 updated June 9, 1999) indicates slight differences for selected materials. The most significant discrepancies are relative to initial USE for weld seam 9-203, fabricated with weld wire heats 90136 and 10137, and Linde 0091 flux. The value of USE documented in Table 4.2-1 is 2.2 ft-lb greater than the value provided by the RVID2. The Table 4.2-1 value is derived from surveillance weld material representative of this weld (same consumables) and constitutes a mean of all data at 100 percent shear. Similarly, the weld seams 2-203A/B/C and 3-203A/B/C fabricated with weld wire heat A8746 and Linde flux 124 have a USE 10.5 ft-lb greater than the RVID2 value. The Table 4.2-1 value is based on a generic value for Linde 124 welds provided in Combustion Engineering Owners Group report CEN-622-A. This report has been reviewed and approved by the NRC.

A comparison of copper content, nickel content, and initial USE for Millstone Unit 2 beltline materials listed in Table 4.2-1 to the values submitted to the NRC in response to GL 92-01 indicate only differences for weld 9-203, heat 90136. Initial USE for weld 9-203, heat 90136 listed in Table 4.2-1 is 21.2 ft-lb greater than the GL 92-01 value. These updated values are based on surveillance data that were identified subsequent to the issuance of the Millstone licensee response to GL 92-01.

The applicant states that acceptable USE values have been calculated in accordance with RG 1.99, Revision 2 to the end of the period of extended operation per 10 CFR 54.21(c)(1)(ii). Calculated USE values for the most limiting RPV beltline plate and weld materials remain greater than 50 ft-lb.

4.2.2.2 Staff Evaluation

Section IV.A.1 to 10 CFR Part 50, Appendix G, provides requirements for demonstrating that reactor vessels (RV) in U.S. pressurized water reactor (PWR) light-water reactor facilities will have ductility throughout their service lives. The Rule requires RV beltline materials to have USE values equal to or above 75 ft-lb initially, and equal to or above 50 ft-lb throughout the life of the vessel. RG 1.99, Revision 2 provides an expanded discussion regarding the calculations of USE values and describes two methods for determining USE values for RV beltline materials, depending on whether or not a given RV beltline material is represented in the plant's Reactor Vessel Material Surveillance Program.

The applicant provided its USE assessments for the RV beltline materials of Millstone Units 2 and 3 in Table 4.2-1 of the applications. However, for Millstone Unit 2, one weld (upper/intermediate shell circumferential weld 8-203, heats 10137 and 33A277) was not included in the USE evaluation. This weld is in the NRC staff's RVID. In RAI 4.2.2-1, the staff requested the applicant to provide a USE evaluation for this weld, or provide justification for not including it in the evaluation.

In response to RAI 4.2.2-1, in a letter dated December 3, 2004, the applicant provided a USE evaluation for the Millstone Unit 2 RPV upper/intermediate shell circumferential weld 8-203. The evaluation provided a USE value for weld 8-203 of 72.2 ft-lb for heat 33A277 and 77.3 ft-lb for heat 10137. The staff confirmed these values and determined that they are conservative and that a USE value of 72.2 ft-lb for weld 8-203 is acceptable. However, the applicant stated in its response that this weld does not meet the definition of beltline region in Appendix G to 10 CFR Part 50, because it is above the active core. However, 10 CFR Part 50 Appendix G, paragraph II.F also defines the beltline region to include adjacent regions of the RV that are predicted to experience sufficient neutron radiation damage to be considered in the selection of the most limited material with regard to radiation damage. In addition, 10 CFR Part 50, Appendix H specifies that material exposed to peak neutron fluence that exceeds 10^{17} n/cm^2 must be monitored by a surveillance program complying with ASTM E 185. Also, RG 1.99, Revision 2, sets forth criteria for evaluating the USE and PTS for material exceeding this fluence value. The applicant determined the inner surface fluence value for this weld to be 2.43×10^{18} n/cm^2. Therefore, the applicant was requested to update the FSAR supplement for Millstone Unit 2 by adding weld 8-203 and the corresponding USE value to Table 1 of the Millstone Unit 2 FSAR supplement.

In response to supplemental RAI 4.2.2-1 in a letter dated February 8, 2005, the applicant provided the USE evaluation for the Millstone Unit 2 reactor pressure vessel upper/intermediate circumferential weld (weld No. 8-203) manufactured from which used weld wire heats 33A277 and 10137. The evaluation is documented in Table 3.1.1-3-1 to Dominion's supplemental response to RAI 3.1.1-3. The applicant calculated the USE values for these materials in accordance with 10 CFR Part 50, Appendix G through the extended period of operation. The results of the USE evaluations on these expanded beltline regions had no effect on the limiting material. The staff confirmed that the limiting material previously identified in the LRA is still bounding. Therefore, since the applicant evaluated all materials that were determined to exceed the $1.0x10^{17}$ n/cm^2 (E>1.0 MeV) boundary and identified that the limiting material specified in the LRA is still bounding, the staff finds this response acceptable. In addition, the level of detail described in the FSAR supplement follows the recommendations of NUREG-1800, Table 4.2-1. This resolves RAI 4.2.2-1.

The USE assessments were based on the 1/4t neutron fluence values listed in LRAs Table 4.2-1. These neutron fluence values are based on the projected values at the end of the periods of extended operation (i.e., 54 EFPY). Section 4.2.3.1 of this SER sets forth the staff's evaluation of the fluence methodologies.

The staff performed independent calculations of the USE values for the RV beltline materials through the period of extended operation for Millstone Units 2 and 3. The staff applied the 1/4t neutron fluence values listed in LRA Table 4.2-1 for the Millstone Unit 3 RV as its basis for its independent calculations since the fluence methodologies were consistent with RG 1.190. For Millstone Unit 2, the staff used both the 1/4t neutron fluence values listed in the LRA Table 4.2-1 and fluence values that were increased by a factor of 40 percent to estimate the variance in the fluence methodologies providing a conservative estimate of the fluence values that would bound the values expected if a RG 1.190-compliant analysis was performed. The staff applied the calculational methods in RG 1.99, Revision 2, as its methodology for performing the independent USE calculations. RG 1.99, Revision 2 requires that all available plant-specific surveillance data be used in determining the USE. The staff's calculations included the use of the surveillance capsule values provide in the RVID. RVID is a database maintained by the staff. It contains a summary of all of the relevant materials data submitted by all applicants in their evaluations of reactor vessel integrity. While performing the independent USE calculations, the staff calculated a USE value for the lower shell plate C-506-1 that differed from the value specified in Table 4.2-1 of the application for 54 EFPY. This difference can be attributed to the applicant performing the evaluation consistent with Position 1.1 of RG 1.99, Revision 2, for material that has no surveillance data available. In RAI 4.2.2-2, the staff requested the applicant to provide the calculated USE value for the lower shell plate C-506-1, heat C5667-1 using all available surveillance data as required by RG 1.99, Revision 2.

In response to RAI 4.2.2-2, in a letter dated December 3, 2004, the applicant provided a USE evaluation for the Millstone Unit 2 RPV lower shell plate C-506-1, heat C5667-1, using all available surveillance data as recommended by RG 1.99, Revision 2. The evaluation provided a USE value for shell plate C-506-1, heat C5667-1, of 54.5 ft-lb, using surveillance capsule W-97. The staff confirmed this value and determined that it is conservative and acceptable. However, the applicant did not include this revised USE value of 54.5 ft-lb in the Millstone Unit 2 FSAR supplement. Therefore, the applicant was requested to update the FSAR supplement for Millstone Unit 2 by revising the USE value from 76.1 ft-lb to 54.5 ft-lb for shell plate C-506-1, heat C5667-1, in Table 1 of Section A3.1.1 to the Millstone Unit 2 FSAR supplement.

In response to supplemental RAI 4.2.2-2 in a letter dated February 8, 2005, the applicant stated that the calculated USE value for Millstone Unit 2 lower shell plate C-506-1, heat number C5667-1 is 65.3 ft-lbs, not the 54.5 ft-lbs originally identified in Table 1 of Dominion's December 3, 2004, response to RAI 4.2.2-2. The 65.3 ft-lbs value represents the reactor pressure vessel lower shell plate C-506-1, heat number C5667-1 USE value developed using all available surveillance data. The USE value of 54.5 ft-lbs previously presented in the RAI response is more conservative than the actual USE value of 65.3 ft-lbs. The staff notes that the value of 54.5 ft-lbs was deemed conservative based on the staff's calculated value of 61 ft-lbs. In either case, the USE value is above the 50 ft-lbs required by 10 CFR Part 50, Appendix G. This also confirms that this subcomponent of the reactor pressure vessel is not the limiting material. The limiting material is discussed below. In addition, the level of detail described in the FSAR supplement follows the recommendations of NUREG-1800, Table 4.2-1. This resolves RAI 4.2.2-2.

In Section 4.2.2 of the Millstone Unit 2 LRA, the applicant stated that there is a difference between the unirradiated USE value presented in Table 4.2-1 of the application and RVID values for the mid-circumferential weld (weld 9-203) fabricated with weld wire heats 90136 and 10137 with Linde 0091 flux. The value of the unirradiated (initial) USE documented in Table 4.2-1 is 2.2 ft-lb greater than the value provided in RVID. The applicant stated that the value in the LRA was based on the mean of all surveillance weld material representative of this weld (same consumables) at 100 percent shear. In RAI 4.2.2-3, the staff requested the applicant to provide all relevant surveillance weld data for each of the weld wire heats (90136 and 10137) which were used to calculate the mean unirradiated USE values for each weld wire heat.

In response to RAI 4.2.2-3, in a letter dated December 3, 2004, the applicant provided all relevant surveillance weld data for each of the weld wire heats (90136 and 10137) which were used to calculate the mean unirradiated USE values for each weld wire heat. Based on the surveillance data results submitted by the applicant, the staff confirmed that the mean unirradiated (initial) USE value for weld 9-203 is 132.2 ft-lb and is acceptable in determining the 54 EFPY USE value for this weld. This resolves RAI 4.2.2-3.

Table 4.2-1 of the Millstone Unit 2 application also stated that the unirradiated USE values for the lower and intermediate axial welds 2-203A, B, and C; and weld 3-203A (heat A8746) using Linde 124 flux was based on the generic value provided in Combustion Engineering Owners Group report CEN-622-A. This report was approved by the NRC in a letter dated September 25, 1996. Previously, the unirradiated USE value was 73 ft-lb, based on Charpy impact data tested at 10 °F. The staff considers this value of 73 ft-lb to be in the transition range of the material, not the upper-shelf range; therefore, the actual unirradiated USE value would be much higher, and the use of the generic value of 83.5 ft-lb based on data in the upper-shelf region is appropriate for the unirradiated USE value for these welds using Linde 124 flux.

The staff determined that at Millstone Unit 2 the lower and intermediate shell axial welds 2-203A, B, and C; and weld 3-203A (heat A8746) are the limiting beltline materials for USE. The staff calculated a USE value of 55.2 ft-lb for these welds at 54 EFPY using the LRAs fluence value. This USE value is in agreement with the 54 EFPY USE value calculated by the applicant for these welds (54.3 ft-lb). In addition, the staff applied a 40 percent increase in fluence to estimate values that would bound fluence values performed in accordance with the guidelines of RG 1.190, yielding an estimated fluence of 4.606×10^{19} n/cm^2 for the limiting lower shell axial welds 2-203A, B, and C; and weld 3-203A. Using this estimated fluence value, the staff calculated a limiting USE value of 52.9 ft-lb. Both of these values meet the acceptance criterion in 10 CFR Part 50, Appendix G, for maintaining the USE values of the RV beltline materials above 50 ft-lb throughout the period of extended operation. The staff confirmed that the updates to the surveillance data (copper content and unirradiated USE values) for Millstone Unit 2, as reported in Section 4.2.2 of the application, did not change the limiting USE material for Millstone Unit 2. The updates include the unirradiated USE values for welds 9-203; 2-203A, B, C; and 3-203A, discussed in the previous paragraphs, which were found acceptable. In addition, the chemistry values for weld 9-203 had different copper contents than what was previously submitted in response to GL 92-01. However, these best-estimate chemistry values were previously approved by SER dated August 30, 1999, and incorporated into RVID; and are therefore acceptable.

The staff determined that, at Millstone Unit 3, lower shell plate B9820-2 (heat D1242-2) is the limiting beltline material for USE. The staff calculated a USE value of 59.0 ft-lb for this plate at 54 EFPY. This value is in agreement with the 54 EFPY USE value calculated by the applicant for this material (58.8 ft-lb). Both of these values meet the acceptance criterion in 10 CFR Part 50, Appendix G, for maintaining the USE values of the RV beltline materials above 50 ft-lb throughout the period of extended operation.

Based on these assessments, the staff has determined that the RVs at Millstone Units 2 and 3 will maintain an acceptable level of USE throughout the units' periods of extended operation. The staff therefore concludes that the applicant's TLAA for USE, as given in Section 4.2.2 of the LRAs, is in compliance with requirements of 10 CFR Part 50, Appendix G.

4.2.2.3 FSAR Supplement

Section A.3.1.1 of each LRA includes the following FSAR supplement summary description for the TLAA on USE:

> 10 CFR 50, Appendix G contains screening criteria that establish limits on how far the upper shelf energy values for a reactor pressure vessel material may be allowed to drop due to neutron irradiation exposure. The regulation requires the initial upper shelf energy value to be greater than 75 ft-lbs in the unirradiated condition and for the value to be greater than 50 ft-lbs in the fully irradiated condition as determined by Charpy V-notch specimen testing throughout the licensed life of the plant. Upper shelf energy values of less than 50 ft-lbs may be acceptable to the NRC if it can be demonstrated that these lower values will provide margins of safety against brittle fracture equivalent to those required by ASME Section XI, Appendix G.
>
> Acceptable upper shelf energy values have been calculated in accordance with Regulatory Guide 1.99, Revision 2 to the end of the period of extended operation. Calculated upper shelf energy values for the most limiting reactor pressure vessel beltline plate and weld materials remain greater than 50 ft-lbs.

The applicant's FSAR supplement summary description does not specify how the RV beltline materials at Millstone Units 2 and 3 will be in compliance with the applicable requirements in 10 CFR Part 50, Appendix G, as projected through the period of extended operation. Specifically, the applicant has not stated which materials are limiting; nor has it stated the materials' USE values. In RAI 4.2.2-4, the staff requested the applicant to provide this information in the FSAR supplements.

In its response to RAI 4.2.2-4, dated December 3, 2004, the applicant provided information, including the beltline USE values, that will be incorporated into Section A3.1.1 of the Millstone Units 2 and 3 FSAR supplements concerning the limiting beltline material and stated that they are in compliance with the applicable requirements in 10 CFR Part 50, Appendix G. The staff has reviewed this information and requests the following supplemental information. The applicant stated that the USE values for the limiting beltline materials have been calculated in accordance with 10 CFR 50.61 and demonstrate acceptable USE values through the period of extended operation. The staff requested that the applicant confirm that the USE analysis was performed in accordance with 10 CFR Part 50, Appendix G, and not 10 CFR 50.61 (which is used for PTS evaluation). The confirmed information should be incorporated into the FSAR supplements accordingly.

In its response to supplemental RAI 4.2.2-4, dated February 8, 2005, the applicant confirmed that the Millstone Units 2 and 3 USE evaluations were performed using 10 CFR Part 50, Appendix G, and not 10 CFR 50.61. The applicant had erroneously cited 10 CFR 50.61 in its response to RAI 4.2.2-4. The applicant also stated that the applicable FSAR supplements reference 10 CFR Part 50, Appendix G. This resolves RAI 4.2.2-4.

The applicant's Millstone FSAR supplements summary descriptions are consistent with the staff analysis for the TLAA on USE in Section 4.2.2.2 of this SER. The FSAR supplements summary descriptions summarize the applicable USE requirements that must be met to ensure continued compliance with 10 CFR Part 50, Appendix G, and demonstrates why the RV beltline materials at Millstone Units 2 and 3 will be in compliance with the applicable requirements in 10 CFR Part 50, Appendix G, as projected through the extended periods of operation for the units. The staff therefore concludes that FSAR supplements summary description for the TLAA on USE is acceptable.

4.2.2.4 Conclusion

The staff has reviewed the applicant's TLAA on USE, as summarized in each LRA Section 4.2.2, and has determined that the RV beltline materials at Millstone Units 2 and 3 will continue to comply with the staff's USE requirements of 10 CFR Part 50, Appendix G, throughout the extended periods of operation for the Millstone units. The staff therefore concludes that the applicant's TLAA for USE is in compliance with the staff's acceptance criterion for TLAAs in 10 CFR 54.21(c)(1)(ii) and that the safety margins established and maintained during the current operating term will be maintained during the periods of extended operation as required by 10 CFR 54.21(c)(1). The staff also concludes that the FSAR supplements contain an appropriate summary description of the TLAA on USE for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.3 Pressurized Thermal Shock

4.2.3.1 Summary of Technical Information in the Application

In each LRA Section 4.2.3, the applicant summarizes the PTS requirements of 10 CFR 50.61 and identifies that the calculation of the adjusted reference temperature values for PTS (i.e., RT_{PTS} values) is a TLAA for the applications. In this section of the LRAs, the applicant provided the following assessment for the RT_{PTS} values for the RV beltline materials at Millstone through the period of extended operation for the units:

> Reactor pressure vessel beltline fluence is one of the factors used in determining the margin of acceptability of the reactor pressure vessel to pressurized thermal shock as a result of radiation embrittlement. The margin is the difference between the maximum nil ductility reference temperature in the limiting beltline material (RT_{PTS}) and the screening criteria established in accordance with 10 CFR 50.61(b)(2). The screening criteria for the limiting reactor vessel materials are 270 °F for beltline plates, forging and axial weld materials, and 300 °F for beltline circumferential weld materials. The 54 EFPY RT_{PTS} values for the reactor pressure vessel beltline materials are summarized within Table 4.2-2. The RT_{PTS} screening criteria have been met in all cases.
>
> Acceptable RT_{PTS} values have been calculated in accordance with Regulatory Guide 1.99, Revision 2 requirements to the end of the period of extended operation per 10 CFR 54.21(c)(1)(ii).

RPV beltline fluence is one of the factors used in determining the margin of acceptability of the RPV to pressurized thermal shock as a result of radiation embrittlement. The margin is the difference between the maximum nil ductility reference temperature in the limiting beltline material (RT_{PTS}) and the screening criteria established in accordance with 10 CFR 50.61(b)(2). The screening criteria for the limiting reactor vessel materials are 270 °F for beltline plates, forgings, and axial weld materials; and 300 °F for beltline circumferential weld materials.

The LRAs contain the applicant's description of the methodology it utilized in calculating RT_{PTS} values. The applicant stated that the methodology is also consistent with RG 1.99, Revision 2 requirements. The 54 EFPY RT_{PTS} values for the RPV beltline materials are summarized within LRAs Table 4.2-2. The RT_{PTS} screening criteria have been met in all cases.

A comparison of copper content, nickel content, and initial RT_{NDT} Millstone Unit 2 beltline materials listed in LRA Table 4.2-2 to the values listed in NRC reactor vessel integrity database (RVID2 version 2.0.5, updated June 9, 1999) identified no differences.

A comparison of copper content, nickel content, initial RT_{NDT} for Millstone Unit 2 beltline materials listed in LRA Table 4.2-2 to the values submitted to the NRC in response to GL 92-01 indicate slight differences for selected materials. The applicant stated that the most significant discrepancies are relative to initial RT_{NDT} for shell plate C-506-2 and shell plate C-506-3. For shell plate C-506-2 the initial RT_{NDT} listed in Table 4.2-2 is 15.4 °F lower than the GL 92-01 value. Similarly, for shell plate C-506-3 the initial RT_{NDT} listed in Table 4.2-2 is 32.0 °F lower than the GL 92-01 value. These updated values are based on original qualification data that were identified subsequent to the issuance of the Millstone response to GL 92-01.

Acceptable RT_{PTS} values have been calculated in accordance with RG 1.99, Revision 2 requirements to the end of the period of extended operation pursuant to 10 CFR 54.21(c)(1)(ii).

4.2.3.2 Staff Evaluation

The staff's requirements for ensuring that the RV beltline materials of pressurized light-water reactors will have adequate protection against the consequences of PTS events are set forth in 10 CFR 50.61. The Rule requires applicants to calculate an adjusted reference temperature value for PTS (i.e., RT_{PTS} values) for each base metal and weld material located in the beltline region of their RVs. The Rule sets a screening limit of 270 °F for RT_{PTS} values that are calculated for plates, forging, and axial weld materials; and a screening limit of 300 °F for RT_{PTS} values that are calculated for circumferential weld materials. The Rule also provides an expanded discussion regarding how the calculations of RT_{PTS} values should be performed and describes two methods for determining RT_{PTS} values for RV beltline materials, depending on whether or not a given RV beltline material is represented in the plant's reactor vessel material surveillance program.

For the RV beltline materials of Millstone Units 2 and 3, the applicant provided its RT_{PTS} value assessments in Table 4.2-2 of the applications. However, for Millstone Unit 2, one weld (upper/intermediate shell circumferential weld 8-203, heats 10137 and 33A277) was not included in the RT_{PTS} evaluation. In RAI 4.2.2-1, the staff requested the applicant to provide a RT_{PTS} evaluation for this weld, or provide justification for not including it in the evaluation. The applicant's RT_{PTS} value assessments for the Millstone units are based on fluence values listed in LRAs Table 4.2-2 for the inner surface location of the RVs, as projected to the end of the extended periods of operation (i.e., 54 EFPY).

In response to RAI 4.2.2-1, in a letter dated December 3, 2004, the applicant provided an RT_{PTS} evaluation for the Millstone Unit 2 reactor pressure vessel upper/intermediate circumferential weld 8-203 which used weld wire heats 33A277 and 10137. The evaluation provided a RT_{PTS} value for weld 8-203 of 97.9 °F for heat 33A277 and 73.9 °F for heat 10137. The staff confirmed these values and determined that they are conservative and therefore acceptable. However, the applicant also stated in its response, that this weld does not meet the 10 CFR Part 50, Appendix G definition of beltline region, since it is above the active core. However, 10 CFR Part 50, Appendix G, paragraph II.F, also defines the beltline region to include adjacent regions of the reactor vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection of the most limited material with regards to radiation damage. In addition, 10 CFR Part 50, Appendix H specifies that material exposed to peak neutron fluence that exceed 10^{17} n/cm^2 must be monitored by a surveillance program complying with ASTM E185. RG 1.99, Revision 2 sets forth criteria for evaluating the USE and RT_{PTS} for material exceeding this fluence value. The applicant determined that the inner surface fluence value for this weld to be 2.43 x10^{18} n/cm^2. Therefore, the applicant was requested to update the FSAR supplement for Millstone Unit 2 by adding weld 8-203 and the corresponding RT_{PTS} value to Table 1 of the FSAR supplement for Millstone Unit 2.

In response to supplemental RAI 4.2.2-1 in a letter dated February 8, 2005, the applicant provided the PTS evaluation for the Millstone Unit 2 reactor pressure vessel upper/intermediate shell circumferential weld (weld No. 8-203) manufactured from weld wire heats 33A277 and 10137. The evaluation is documented in Table 3.1.1-3-2 to Dominion's supplemental response to RAI 3.1.1-3. The applicant calculated the PTS values for these materials in accordance with 10 CFR 50.61 through the extended period of operation. The results of the PTS evaluations on these expanded beltline regions had no effect on the limiting material. The staff confirmed that the limiting material previously identified in the LRA is still bounding. Therefore, since the applicant performed the evaluations of all materials that were determined to exceed the 1.0×10^{17} n/cm^2 (E>1.0 MeV) boundary and identified that the limiting material specified in the LRA is still bounding, the staff finds this response acceptable. In addition, the level of detail described in the FSAR supplement follows the recommendations of NUREG-1800, Table 4.2-1. This resolves RAI 4.2.2-1.

To confirm the validity of the applicant's limiting 54 EFPY RT_{PTS} value for the Millstone Unit 2 RV, the staff performed independent calculations of the RT_{PTS} values through the period of extended operation. For Millstone Unit 2, the staff used both the inside diameter neutron fluence values listed in LRA Table 4.2-1 and fluence values that were increased by a factor of 40 percent to estimate the variance in the fluence methodologies providing a conservative estimate of the fluence values that would bound the values expected if a RG 1.190-compliant analysis was performed. The staff determined that for Millstone Unit 2, lower shell plate C-506-1 (heat C5667-1) is the limiting RV beltline material for PTS. The staff calculated an RT_{PTS} value of 190.5 °F for this material at 54 EFPY (using the LRA fluence value), which is in agreement with the applicant's calculation. Applying the 40 percent increase in fluence to estimate values that would bound fluence values performed with the guidelines of RG 1.190 yields an estimated fluence of 5.67×10^{19} n/cm^2 for the limiting lower shell plate C-506-1 (heat C5667-1). Using this estimated fluence value, the staff calculated a limiting RT_{PTS} value of 197.9 °F. Both of these values meet the screening criteria of 270 °F. The staff also notes that the copper content, nickel content, and the initial RT_{NDT} values listed in Table 4.2-2 of the LRA are consistent with the values in RVID. Therefore, the staff concludes that the Millstone Unit 2 RV can meet the requirements of 10 CFR 50.61 through the period of extended operation for the unit.

To confirm the validity of the applicant's limiting 54 EFPY RT_{PTS} value for the Millstone Unit 3 RV, the staff performed independent calculations of the RT_{PTS} values through the period of extended operation. The staff determined that at Millstone Unit 3, intermediate shell plate B9805-1 (heat C4039-2) is the limiting beltline material for PTS. The staff calculated an RT_{PTS} value of 134.7 °F for this plate material at 54 EFPY. This value is in agreement with the limiting material and RT_{PTS} value reported by the applicant. The staff also notes that the copper content, nickel content, and the initial RT_{NDT} values listed in Table 4.2-2 of the LRA are consistent with the values in RVID. Therefore, the staff concludes that the Millstone Unit 3 RV can meet the requirements of 10 CFR 50.61 through the period of extended operation for the unit.

4.2.3.3 FSAR Supplement

Each LRA Section A.3.1.2 includes the following FSAR supplement summary description for the TLAA on PTS:

> Reactor pressure vessel beltline fluence is one of the factors used to determine the margin to reactor pressure vessel pressurized thermal shock as a result of radiation embrittlement. The margin is the difference between the maximum nil ductility reference temperature in the limiting beltline material (RT_{PTS}) and the screening criteria established in accordance with 10 CFR 50.61(b)(2). The

screening criteria for the limiting reactor vessel materials are 270 °F for beltline plates, forging and axial weld materials, and 300 °F for beltline circumferential weld materials.

Acceptable RT_{PTS} values have been calculated in accordance with Regulatory Guide 1.99, Revision 2, requirements to the end of the period of extended operation.

The applicant's FSAR supplement summary description does not specify how the RV beltline materials at Millstone Units 2 and 3 will be in compliance with the applicable requirements in 10 CFR 50.61, as projected through the periods of extended operation. Specifically, the applicant has not stated which materials are limiting, and their corresponding RT_{PTS} values to demonstrate that the applicable requirements were met. In RAI 4.2.3-1, the staff requested that the applicant provide this information in the FSAR supplements.

In its response to RAI 4.2.3-1, dated December 3, 2004, the applicant provided information that will be incorporated into Section A3.1.2 of the Millstone Units 2 and 3 FSAR supplements concerning the limiting beltline material and further stated that they are in compliance with the applicable requirements of 10 CFR Part 50.61. The staff reviewed this information and requested additional supplemental information. The applicant stated that the RT_{PTS} values for the limiting beltline materials have been calculated in accordance with RG 1.99, Revision 2 through the period of extended operation and demonstrate acceptable RT_{PTS} values through the period of extended operation. The applicant needed to confirm that the RT_{PTS} analysis was performed in accordance with 10 CFR 50.61. The confirmed information needed to be incorporated into the FSAR supplements accordingly.

In its response to supplemental RAI 4.2.3-1. dated February 8, 2005, the applicant confirmed that the Millstone Units 2 and 3 PTS evaluations were developed in accordance with 10 CFR 50.61, and not RG 1.99, Revision 2. The applicant had erroneously cited RG 1.99, Revision 2 in its response to RAI 4.2.3-1. The applicant also stated that the applicable FSAR supplements reference 10 CFR 50.61. This resolves RAI 4.2.3-1.

The applicant's FSAR supplements summary description is consistent with the staff analysis for the TLAA on PTS in Section 4.2.3.2 of this SER. The FSAR supplements summary descriptions summarize the applicable PTS requirements that must be met to ensure continued compliance with 10 CFR 50.61 and discuss why the RV beltline materials at Millstone Units 2 and 3 are in compliance with the applicable requirements of 10 CFR 50.61, as projected through the periods of extended operation for the units. The staff therefore concludes that FSAR supplement summary description for the TLAA on PTS is acceptable.

4.2.3.4 Conclusion

The staff has reviewed the applicant's TLAA on PTS, as summarized in Section 4.2.3 of the LRA and has determined that the RV beltline materials at Millstone Units 2 and 3 will continue to comply with the staff's requirements for PTS in 10 CFR 50.61 throughout the periods of extended periods of operation for the Millstone units. The staff therefore concludes that the applicant's TLAA for PTS is in compliance with the staff's acceptance criterion for TLAAs in 10 CFR 54.21(c)(1)(ii) and that the safety margins established and maintained during the current operating term can be maintained during the periods of extended operation as required by

10 CFR 54.21(c)(1). The staff also concludes that the FSAR supplement contains an appropriate summary description of the TLAA on PTS for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.4 Pressure-Temperature (P-T) Limits

4.2.4.1 Summary of Technical Information in the Application

In Section 4.2.4 of the LRAs, the applicant concluded that the P-T limits for Millstone Units 2 and 3 met the definition in 10 CFR 54.4 for TLAAs. The applicant concluded that the P-T limits for the Millstone units were TLAAs that needed to be assessed against the acceptance criteria of 10 CFR 54.21(c)(1). The applicant provided the following assessment for the TLAA on the P-T limits:

> 10 CFR Part 50, Appendix G requires that heatup and cooldown of the reactor pressure vessel be accomplished within established pressure-temperature limits. These limits identify the maximum allowable pressure as a function of reactor coolant temperature. As the pressure vessel becomes irradiated and its fracture toughness is reduced, the allowable pressure at low temperatures is reduced. Therefore, in order to heatup and cooldown, the reactor coolant temperature and pressure must be maintained within the limits of Appendix G as defined by the reactor pressure vessel fluence.
>
> In accordance with 10 CFR 50, Appendix G, updated pressure-temperature limits for the period of extended operation will be developed and implemented prior to the period of extended operation.
>
> Consistent with 10 CFR 54.21(c)(1)(iii), acceptable pressure-temperature limits will be developed and implemented in accordance with 10 CFR 50, Appendix G prior to the period of extended operation.

The 10 CFR Part 50, Appendix G requires that heatup and cooldown of the reactor pressure vessel be accomplished within established P-T limits. These limits identify the maximum allowable pressure as a function of reactor coolant temperature.

As the pressure vessel becomes irradiated and its fracture toughness is reduced, the allowable pressure at low temperatures is reduced. Therefore, in order to heat up and cool down, the reactor coolant temperature and pressure must be maintained within the limits of 10 CFR Part 50, Appendix G as defined by the reactor pressure vessel fluence.

Heat up and cool down limit curves have been calculated using the adjusted RT_{NDT} corresponding to the limiting beltline material of the reactor pressure vessel for the current period of licensed operation. Current low temperature overpressure protection (LTOP) system heat up and cool down limit curves were approved in license amendment 218. Current cold overpressure protection system (COPS) heat up and cool down limit curves were approved for Millstone Unit 3 in license amendment 197.

The applicant stated that, consistent with 10 CFR 54.21(c)(1)(iii), acceptable P-T limits will be developed and implemented in accordance with 10 CFR 50, Appendix G prior to the period of extended operation.

4.2.4.2 Staff Evaluation

Paragraph IV.A.2 of 10 CFR Part 50, Appendix G, provides the requirements and criteria for generating the P-T limits that are required for commercial U.S. light-water reactors. The applicant plans to calculate vessel P-T limit curves for 60 years (54 EFPYs) and submit them to the NRC for approval before the start of the period of extended operation. The LRA did not state whether the fluence methodology would be in accordance with RG 1.190 when managing the P-T limits, or where these P-T limit requirements will be documented. Therefore, in RAI 4.2.4-1, the staff asked if the applicant will manage the P-T limits using approved fluence calculations in conjunction with surveillance capsule results from the surveillance program. Also, the applicant was requested to state if the technical specification would be updated upon calculating the P-T limits for the period of extended operation. The applicant was asked to include this information in the Millstone FSAR supplements to describe the management of the P-T limits.

In response to RAI 4.2.4-1, in a letter dated December 3, 2004, the applicant updated Section A3.1.3 of the Millstone Units 2 and 3 FSAR supplements to incorporate a summary description on the current methodology of calculating neutron fluence and the use of RG 1.190 in developing fluence values for the P-T limit curves in the period of extended operation. This includes a statement in the proposed Millstone FSAR supplements that when developing the Millstone Units 2 and 3 P-T limit curves for the period of extended operation, fluence values will be calculated in accordance with RG 1.190 recommendations. Millstone Unit 3 uses a fluence methodology in accordance with DG-1053. This is the draft version of RG 1.190 and provides similar conservatism when calculating the reactor vessel fluence values. However, Millstone Unit 2 does not use a fluence methodology in accordance with RG 1.190. In addition, the applicant is planning to submit P-T limit curves for 54 EFPY to the NRC in 2005. Therefore, since the applicant will be providing new P-T limit curves for 54 EFPY, the staff requests that the applicant commit to submit the reactor vessel fluence calculations using a methodology in accordance with RG 1.190, which will also support the P-T limit curve submittal, to the NRC along with the 54 EFPY P-T limit curves in 2005. The resolution of this issue is addressed in Section 4.2.1.3.

The staff finds the applicant’s plan to manage the P-T limits acceptable because the change in the P-T limits will be submitted to the NRC for approval before the start of the period of extended operation and implemented via the license amendment process (i.e., modifications of technical specifications), thereby meeting the requirements of 10 CFR 50.60 and Appendix G to 10 CFR 50.

4.2.4.3 FSAR Supplement

Each Section A3.1.3 of the LRAs includes the following FSAR supplement summary description for the TLAA on the Millstone P-T limits:

> <u>Millstone Unit 2</u>
> Heatup and cooldown limit curves have been calculated using the adjusted RT_{NDT} corresponding to the limiting beltline material of the reactor pressure vessel for

the current period of licensed operation. Current low temperature overpressure protection (LTOP) system heatup and cooldown limit curves were approved in license amendment 218.

In accordance with 10 CFR 50, Appendix G, updated pressure-temperature limits for the period of extended operation will be developed and implemented prior to the period of extended operation. Low temperature overpressure protection system enable temperature requirements will be updated to ensure that the pressure-temperature limits will not be exceeded for postulated plant transients during the period of extended operation.

Millstone Unit 3
Heatup and cooldown limit curves have been calculated using the adjusted RT_{NDT} corresponding to the limiting beltline material of the reactor pressure vessel for the current period of licensed operation. Current cold overpressure protection system (COPS) heatup and cooldown limit curves were approved in license amendment 197.

In accordance with 10 CFR 50, Appendix G, updated pressure-temperature limits for the period of extended operation will be developed and implemented prior to the period of extended operation. Cold overpressure protection system enable temperature requirements will be updated to ensure that the pressure-temperature limits will not be exceeded for postulated plant transients during the period of extended operation.

On the basis of the staff's evaluation described above, the summary description for the reactor coolant system TLAA for reactor vessel P-T limits described in the FSAR supplements provides an adequate description of this TLAA, as required by 10 CFR 54.21.

4.2.4.4 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii) and 10 CFR 54.21(c)(1)(iii), that the applicant can generate the P-T limits for the periods of extended operation for Millstone Units 2 and 3 in accordance with the technical specifications process. The staff will evaluate the end-of-extended-operating-term P-T limit curves for Millstone upon submittal by the applicant. The staff’s review of the period-of-extended-operation P-T limit curves, when submitted, will ensure that the reactor coolant system for Millstone Units 2 and 3 will be operated in a manner that ensures the integrity of the reactor coolant system during the period of extended operation and that the curves, when submitted, will satisfy the requirements of 10 CFR 54.21(c)(1)(ii) for the period of extended operation. Because evaluation of P-T limit curves is performed when the limits are updated through the technical specification process, they need not be evaluated now. The technical specification process provides a process for managing P-T limits, in accordance with 10 CFR 54.21(c)(1)(iii).

4.3 Metal Fatigue

A metal component subjected to cyclic loading at loads less than the static design load may fail due to fatigue. Metal fatigue of components may have been evaluated based on an assumed number of transients or cycles for the current operating term. The validity of such metal fatigue analysis is reviewed for the period of extended operation.

4.3A Unit 2 Metal Fatigue

4.3A.1 Summary of Technical Information in the Application

The applicant discussed the design of reactor coolant pressure boundary (RCPB) components in Section 4.3.1 of the LRA. Components of the RCPB were designed to the ASME Boiler and Pressure Vessel Code, Section III requirements for Class 1 components and the requirements for ANSI B31.7 Class 1 piping components. Table 4.3.2 lists the transients and number of transient cycles used in the design of ASME Class 1 components. Table 4.3.2 also lists the estimated number of transient cycles for 60 years of plant operation. The applicant's estimate indicates that the number of design cycles will remain bounding for the period of extended operation. The applicant indicated that the significant design transients are tracked by a fatigue monitoring program (FMP).

In addition to the design of Class 1 components using transient cycles listed in Table 4.3.2 of the LRA, the applicant identified evaluations that were performed to address other specific issues. These evaluations were performed for the surge line to address NRC Bulletin 88-11, "Pressurizer Surge Line Thermal Stratification," and to address the potential for temperature stratification and oscillations in unisolable sections of pipe in response to NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant Systems." The applicant indicated that the evaluations remain valid for the period of extended operation.

The applicant discussed the evaluation of ASME Class 2 and 3, ANSI B31.7 Class 2 and 3, and ANSI B31.1 components in Section 4.3.2 of the LRA. The codes and standards for ASME Class 2 and 3, ANSI B31.7 Class 2 and 3, and ANSI B31.1 components require that a stress-reduction factor be applied to the allowable thermal bending stress range if the number of full-range cycles exceeds 7,000. The applicant identified three piping systems within the scope of license renewal that have been projected to exceed 7,000 full-temperature cycles during the period of extended operation. The applicant evaluated these piping systems for the number of expected cycles and found them acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

The applicant discussed the evaluation of environmentally-assisted fatigue of RCPB components in Section 4.3.3 of the LRA. The applicant provided the results of an evaluation of the environmental effects on the components listed in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components." The applicant indicated that the environmental fatigue correlations in NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," and NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," were used in the evaluations. The applicant's evaluation indicated that all components had acceptable fatigue usage for the period of extended operation.

4.3A.2 Staff Evaluation

As discussed previously, RCPB components were designed to the Class 1 requirements of the ASME Code and the Class 1 requirements of ANSI B31.7. These requirements contain explicit criteria for the fatigue analysis of components. Consequently, the applicant identified the fatigue analysis of these components as TLAAs. The staff reviewed the applicant's evaluation of the RCPB components for compliance with the provisions of 10 CFR 54.21(c)(1).

The specific design criterion for fatigue analysis of RCPB components involves calculating the cumulative usage factor (CUF). The fatigue damage in the component caused by each thermal or pressure transient depends on the magnitude of the stresses caused by the transient. The CUF sums the fatigue damage resulting from each transient. The design criterion requires that the CUF not exceed 1.0.

Table 4.3-2 of the LRA provides the current cycle counts and estimated cycle counts at 60 years of plant operation for transients used in the design of ASME Class 1 components. The staff compared the list of monitored transients with those listed in Millstone FSAR Section 4.2.1. The applicant monitors all of the normal, upset, and test transients listed in FSAR Section 4.2.1 with the exception of loading/unloading and step-load change cycles. The applicant indicated that these cycles are not counted because the transients produce insignificant fatigue usage contributions to any Class 1 component. In RAI 4.3.1-2, the staff requested that the applicant indicate whether these transients contributed to the cumulative usage factors for the vessel inlet/outlet nozzles reported in Table 4.3-3 of the LRA. The staff also requested that the applicant provide a summary of the load pairs that contribute to the fatigue usage of the vessel inlet/outlet nozzles and the corresponding fatigue usage for each load pair.

The applicant's December 3, 2004, response indicated that the loading/unloading and step-change transients are significant contributors to the design fatigue usage factors for the reactor vessel inlet/outlet nozzles. Even though these transients are significant contributors to the design CUF for these nozzles, the design CUFs are well below the allowable limit of 1.0. In addition, the applicant indicated that the number of design cycles assumed for plant loading/unloading and step-change transients is considered conservative based on plant operation. As a consequence, these transients are not expected to cause significant fatigue usage in the inlet/outlet nozzles for the period of extended operation. The staff agrees with the applicant that it is not necessary to track these transients. On the basis of the information provided by the applicant, the staff finds that the FMP tracks the significant design transients listed in FSAR Section 4.2.1.

The applicant stated in the LRA that an FMP monitors the significant design transients at Millstone Unit 2. The applicant also indicated that FatiguePro software is used to monitor significant transient cycles, and that stress-based fatigue monitoring is used at locations of high-fatigue usage. In RAI 4.3.1-1, the staff requested that the applicant list the locations where stress-based fatigue monitoring is used. The staff also requested that the applicant indicate the length of time the FatiguePro software has been used and describe how the number of transient cycles and fatigue usage was determined prior to installation of the FatiguePro software.

The applicant's December 3, 2004, response indicated that stress-based fatigue monitoring is used at the pressurizer surge nozzle and the reactor coolant system (RCS) hot-leg surge nozzle.

The applicant indicated that the FatiguePro software was used to analyze process computer data from 1996 to the present to obtain the fatigue usage for each transient. The applicant also indicated that operator logs were used to identify transient occurrences prior to 1996. The fatigue usage associated with the transient occurrences prior to 1996 was estimated using the fatigue usage calculated from the FatiguePro software for the transients that occurred after 1996. The staff finds that the applicant’s method of estimating the fatigue usage prior to 1996 reasonable and acceptable.

As discussed in Section 4.3A.1 of this SER, the applicant performed additional evaluations in response to NRC Bulletins 88-08 and 88-11. The applicant’s evaluation for NRC Bulletin 88-08 is summarized in a September 20, 1988, letter to the NRC. The applicant indicated that no piping sections susceptible to the concerns identified in NRC Bulletin 88-08 were discovered at Millstone Unit 2. Therefore, no additional evaluation was required by the applicant for the period of extended operation.

The applicant indicated that an additional evaluation of the pressurizer surge line was performed in response to NRC Bulletin 88-11. The applicant referenced the generic analysis in Combustion Engineering Owners Group Report CEN-387-P as bounding for Millstone Unit 2. The staff found that CEN-387-P provided an acceptable evaluation of the pressurizer surge line thermal concern in its safety evaluation dated July 6, 1993. As discussed previously, the applicant monitors critical surge line locations using FatiguePro stress-based software. Therefore, the applicant’s FMP will assure that the pressurizer surge line evaluation remains valid for the period of extended operation.

Section 4.3.2 of the LRA describes the evaluation of non-Class 1 components. The LRA indicates that three piping systems may exceed 7,000 full-temperature thermal cycles during the period of extended operation. The LRA also indicates that these systems were evaluated using appropriate stress-range reduction factors and found acceptable for the period of extended operation. In RAI 4.3.2-1 the staff requested that the applicant describe the criteria used to obtain the stress-range reduction factors.

The applicant’s November 9, 2004, response indicated that ASME Section III, Subsection NC-3600 was used for the re-analysis of the hot-leg sample line, the pressurizer steam space sample line and the common hot-leg/pressurizer steam space sample line. The applicant provided the results of the analysis in Table 1 of the response. Table 1 shows the calculated stresses are well within the allowable stresses for the number of thermal expansion cycles expected for the period of extended operation. On the basis of the information provided by the applicant, the staff finds that the applicant has performed an acceptable evaluation of the sample lines for the period of extended operation in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

The applicant indicates that the FMP will continue during the period of extended operation and will assure that design cycle limits are not exceeded. The applicant’s FMP tracks transients and cycles of RCS components that have explicit design transient cycles to assure that these components remain within their design basis. Generic Safety Issue 166 (GSI-166), “Adequacy of the Fatigue Life of Metal Components,” raised concerns regarding the conservatism of the fatigue curves used in the design of the RCS components. Although GSI-166 was resolved for the current 40-year design life of operating components, the staff identified GSI-190, “Fatigue

Evaluation of Metal Components for 60-year Plant Life," to address license renewal. The NRC closed GSI-190 in December 26, 1999 (see Appendix D, Reference 17), concluding:

> The results of the probabilistic analyses, along with the sensitivity studies performed, the iterations with industry (NEI and EPRI), and the different approaches available to the applicants to mange the effects of aging, lead to the conclusion that no generic regulatory action is required, and that GSI-190 is closed. This conclusion is based primarily on the negligible calculated increases in core damage frequency in going from 40- to 60-year lives. However, the calculations supporting resolution of this issue, which included consideration of environmental effects, and the nature of age-related degradation indicate the potential for an increase in the frequency of pipe leaks as plants continue to operate. Thus, the staff concludes that, consistent with existing requirements in 10 CFR 54.21, applicants should address the effects of coolant environment on component fatigue life as aging management programs are formulated in support of license renewal.

The applicant indicated that it evaluated six component locations equivalent to those identified in NUREG/CR-6260 for a newer vintage Combustion Engineering plant. The staff finds these acceptable locations for evaluating environmental fatigue. The applicant provided the design and environmental usage factors in Table 4.3-3 of the LRA. All of the design and environmental usage factors are less than the allowable limit of 1.0.

The staff compared the applicant's calculated fatigue usage factors with those listed in NUREG/CR-6260. The applicant's calculated fatigue usage factors were less than those listed in NUREG/CR-6260 for a newer vintage Combustion Engineering plant. However, the applicant's reported usage factors are more in line with the values listed in NUREG/CR-6260 for an older vintage Combustion Engineering plant. The staff notes that the NUREG/CR-6260 evaluation for the newer vintage Combustion Engineering plant was for San Onofre Unit 2 and 3 components. The San Onofre units have a greater thermal power level than Millstone Unit 2, which may account, in part, for the difference in calculated usage factor. As an additional check, the staff compared the usage factors with the usage factors provided by the applicant during the license renewal review of St. Lucie Units 1 and 2. St. Lucie Units 1 and 2 are Combustion Engineering plants that have thermal power levels comparable to Millstone Unit 2. The Millstone Unit 2 usage factors are comparable to the St. Lucie Units 1 and 2 usage factors, with the exception of the surge line. As indicated previously, the applicant uses stress-based fatigue monitoring for the surge line and, as a consequence, the staff expects lower usage factors for the surge line components. On the basis of the comparison of the reported usage factors with previous Combustion Engineering plants of comparable power level, the staff concludes the usage factors provided by the applicant in Table 4.3-3 are reasonable.

The staff noted that the applicant provided usage factors for the low-alloy charging and safety injection nozzles, whereas NUREG/CR-6260 indicates the highest environmental usage factors for the newer vintage Combustion Engineering plant occurred in the nozzle safe-ends. In a December 3, 2004, response, the applicant indicated that the highest design CUFs for the safety injection and charging nozzles occurred in the low-alloy nozzles. However, the applicant also indicated that, using worst case environmental factors for stainless steel, the calculated CUF for the charging nozzle safe-end is greater than the low-alloy nozzle. The applicant indicated that the environmental usage factor for the safe-end is less than 1.0 using the projected number of cycles for 60 years of plant operation. Since the applicant used projected cycles instead of design cycles to evaluate the charging nozzle safe-end, the applicant's FMP should incorporate these cycles in the program. This was identified as Confirmatory Item 4.3-1.

In response to Confirmatory Item 4.3-1, in a letter dated April 1, 2005, the applicant stated that cycle counting has been incorporated in the Millstone FMP and the projected cycles versus design cycles are now used in the evaluation of the charging nozzle safe-ends, with acceptable results through the period of extended operation. Based on this response, Confirmatory Item 4.3-1 is closed.

The applicant evaluated the effects of the reactor water environment on the fatigue-sensitive locations and concluded that the resulting fatigue usage will be acceptable for the period of extended operation. The staff finds that the applicant has performed an acceptable evaluation of the environmental fatigue usage of the fatigue-sensitive locations identified in NUREG/CR-6260. The staff also finds that the applicant's FMP provides additional assurance that the fatigue usage at these locations will not exceed the allowable limit of 1.0 during the period of extended operation.

4.3A.3 FSAR Supplement

The applicant provided a Millstone FSAR supplement description of the FMP in Section A4.2 of the LRA and a description of its TLAA evaluation for metal fatigue analysis in Section A3.2 of the LRA. On the basis of its review of the FSAR supplement, the staff concludes the summary description of the applicant's actions to address metal fatigue of components is adequate.

4.3A.4 Conclusion

The staff has reviewed the applicant's metal fatigue TLAA and concludes the applicant's actions and commitments satisfy the requirements of 10 CFR 54.21(c)(1).

The staff has also reviewed the Millstone FSAR supplement for the TLAA and finds that the FSAR supplement contains an adequate description of the metal fatigue of components to satisfy 10 CFR 54.21(d).

4.3B <u>Unit 3 Metal Fatigue</u>

4.3B.1 Summary of Technical Information in the Application

The applicant discussed the design of reactor coolant pressure boundary (RCPB) components in Section 4.3.1 of the Unit 3 LRA. Components of the RCPB were designed to the ASME Boiler and Pressure Vessel Code, Section III, requirements for Class 1 components. Table 4.3.2 lists the transients and number of transient cycles used in the design of ASME Class 1 components. Table 4.3.2 also lists the estimated number of transient cycles for 60 years of plant operation. The applicant's estimate indicates that the number of design cycles will remain bounding for the period of extended operation. The applicant indicated that the significant design transients are tracked by an FMP.

In addition to the design of Class 1 components using transient cycles listed in Table 4.3.2 of the LRA, the applicant identified evaluations that were performed to address other specific issues.

These evaluations were performed for the surge line to address NRC Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification,” and to address the potential for temperature stratification and oscillations in unisolable sections of pipe in response to NRC Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Coolant Systems.” The applicant indicated that the evaluations remain valid for the period of extended operation.

The applicant discussed the evaluation of ASME Class 2 and 3, ANSI B31.7 Class 2 and 3, and ANSI B31.1 components in Section 4.3.2 of the LRA. The codes and standards for ASME Class 2 and 3, ANSI 31.7 Class 2 and 3, and ANSI B31.1 components require that a stress-reduction factor be applied to the allowable thermal bending stress range if the number of full-range cycles exceeds 7,000. The applicant indicated that piping systems within the scope of license renewal are bounded by the 7,000 cycles. Therefore, the applicant concluded that the existing pipe stress calculations are valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

The applicant discussed the evaluation of environmentally-assisted fatigue of RCPB components in Section 4.3.3 of the LRA. The applicant provided the results of an evaluation of the environmental effects on the components listed in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components.” The applicant indicated that the environmental fatigue correlations in NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” and NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels,” were used in the evaluations. The applicant’s evaluation indicated that four of the six components are projected to exceed a usage factor of 1.0 during the period of extended operation when environmental effects are considered. The applicant proposed to manage these four components in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

4.3B.2 Staff Evaluation

As discussed previously, components of the RCPB were designed to the Class 1 requirements of the ASME Code. These requirements contain explicit criteria for the fatigue analysis of components. Consequently, the applicant identified the fatigue analysis of these components as TLAAs. The staff reviewed the applicant’s evaluation of the RCPB components for compliance with the provisions of 10 CFR 54.21(c)(1).

The specific design criterion for fatigue analysis of RCPB components involves calculating the cumulative usage factor (CUF). The fatigue damage in the component caused by each thermal or pressure transient depends on the magnitude of the stresses caused by the transient. The CUF sums the fatigue damage resulting from each transient. The design criterion requires that the CUF not exceed 1.0. The applicant indicated that the FMP monitors the design transients at Millstone Unit 3. Table 4.3.2 of the LRA provides the current cycle counts and estimated cycle counts at 60 years of plant operation for transients used in the design of ASME Class 1 components. The LRA indicates that FatiguePro software is used to monitor the number of significant transient cycles and that stress-based fatigue monitoring is used at locations of high fatigue usage. In RAI 4.3.1-1, the staff requested that the applicant list the locations where stress-based fatigue monitoring is used. The staff also requested that the applicant indicate the length of time the FatiguePro software has been used and describe how the number of transient cycles and fatigue usage was determined prior to installation of the FatiguePro software.

The applicant's December 3, 2004, response indicated that stress-based fatigue monitoring is used at the pressurizer surge nozzle, pressurizer heater penetration, RCS hot-leg surge line nozzle, charging nozzle, safety injection nozzle, and RHR tee. The applicant indicated that the FatiguePro software was used to analyze process computer data from 1996 to the present to obtain the fatigue usage for each transient. The applicant also indicated that operator logs were used to identify transient occurrences prior to 1996. The fatigue usage associated with the transient occurrences prior to 1996 was estimated using the fatigue usage calculated from the FatiguePro software for the transients that occurred after 1996. The staff finds that the applicant's method of estimating the fatigue usage prior to 1996 reasonable and acceptable.

The applicant also provided a list of the transients monitored by the FMP. The staff compared the list of monitored transients with those listed in Millstone FSAR Table 3.9N-1. The applicant indicated that a number of the normal and upset transients listed in FSAR Table 3.9N-1 are not monitored because they produce insignificant fatigue usage. These transients include steady-state fluctuations, step-load decrease with steam dump, feedwater cycling, loop-out-of-service startup and shutdown, loading and unloading between 0 and 15 percent full power, boron concentration equalization, refueling, reduced-temperature return to power, turbine roll test, inadvertent reactor coolant depressurization, and inadvertent startup of inactive loop. The staff reviewed the transients listed in NUREG/CR-6260 for the fatigue evaluation of components in a newer-vintage Westinghouse PWR. The staff notes that the transients listed above did not contribute significantly to the fatigue usage of the components evaluated in NUREG/CR-6260. Therefore, the staff agrees with the applicant that it is not necessary to track these transients. On the basis of the information provided by the applicant, the staff finds that the FMP tracks the significant design transients listed in FSAR Table 3.9N-1.

The Westinghouse Owners Group issued topical report WCAP-14577, Revision 1-A, "Aging Management for Reactor Internals," to address the aging management of the reactor vessel internals (RVIs). The staff's review of WCAP-14577, Revision 1-A identified a number of issues that should be addressed on a plant-specific basis. Renewal Applicant Action Item 11 specified in WCAP-14577, Revision 1-A indicates that the fatigue TLAA of the RVI should be addressed on a plant-specific basis. In RAI 4.3.1-3, the staff requested that the applicant discuss the design basis for the components listed in Table 3-3 of WCAP-14577, Revision 1-A and indicate how fatigue of these components is managed.

The applicant's November 9, 2004, response indicated that the RPV stress report does not address fatigue of the RVI. Therefore, the applicant concluded that there is no fatigue TLAA associated with the RVI. Section 3.9N.5.2 of the FSAR discusses the design-loading conditions for the RVI. The FSAR indicates that the RVI were evaluated using the thermal transients listed in FSAR Table 3.9N.1. Since these are the same transients used in the fatigue evaluation of RCS components, the staff requested that the applicant confirm that there is no TLAA associated with the RVI. In a followup response (e-mail dated December 20, 2004, from W. Watson (MPS) to J. Eads (NRC)), the applicant confirmed that its internal searches and external searches by Westinghouse did not identify a TLAA associated with the RVI. As discussed previously, the applicant estimates that number of significant design transient cycles listed in FSAR Table 3.9N-1 remain bounding for the period of extended operation. The staff concludes that, even if a TLAA associated with the RVI exists, it would remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

The Westinghouse Owners Group issued Topical Report WCAP-14575-A, "Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components," to address aging management of the RCS piping. Tables 3-2 through 3-16 of WCAP-14575-A list RCS components where fatigue is considered significant. The staff review of WCAP-14575-A identified a number of issues that should be addressed on a plant-specific basis. Renewal Applicant Action Item 8 indicates that the applicant should address components labeled I-M and I-RA in Tables 3-2 through 3-16 of WCAP-14575-A. The applicant's FMP monitors the significant plant design transients listed in FSAR Table 3.9N-1 that were used in the design of RCPB components. The staff finds that the applicant's FMP, which monitors the significant plant design transients, adequately addresses Renewal Applicant Action Item 8.

The Westinghouse Owners Group has issued the generic Topical Report WCAP-14574-A to address aging management of pressurizers. The staff's review of WCAP-14574-A identified a number of issues that should be addressed on a plant-specific basis. Renewal Applicant Action Item 1 requests the applicant to demonstrate that the pressurizer subcomponent CUFs remain below 1.0 for the period of extended operation. Table 2-10 of WCAP-14574-A indicates that the ASME Section III Class 1 fatigue CUF criterion could be exceeded at several pressurizer subcomponent locations during the period of extended operation. WCAP-14574-A also identified recent unanticipated transients that were not considered in the original ASME Section III Class 1 fatigue analyses, including inflow/outflow thermal transients. In RAI 4.3.1-4, the staff requested the applicant to provide the following information:

- Confirm that the additional transients discussed in WCAP-14574-A, not considered in the original design, have been addressed at Millstone Unit 3.
- Show the ASME Section III Class 1 CLB CUFs for the applicable subcomponents of the Millstone pressurizers specified in Table 2-10 of WCAP-14574-A and the corresponding CUFs for the period of extended operation.
- Discuss the impact of the environmental fatigue correlations provided in NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," and NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," on the above results.

The applicant's December 3, 2004, response indicated that the pressurizer lower head and surge-line nozzle were evaluated for the additional transients discussed in WCAP-14574-A. The applicant provided the CUFs for the period of extended operation for the subcomponents listed in Table 2-10 of WCAP-14574-A. All CUFs are less than 1.0 for the period of extended operation.

The applicant also discussed the impact of the environmental fatigue correlations on the pressurizer subcomponents. The applicant committed to use the pressurizer surge-line nozzle as a leading indicator to address environmental fatigue of the pressurizer subcomponents during the period of extended operation. The staff finds that the pressurizer surge-line nozzle is an acceptable sample component location for assessing the impact of environmental fatigue on the pressurizer components. The staff accepted this position during its review of other license renewal applications for Westinghouse plants.

As discussed in Section 4.3B.1 of this SER, the applicant performed an additional evaluation of the pressurizer surge line in response to NRC Bulletin 88-11. The applicant's evaluation indicated that the usage factor, including environmental effects, will remain less than 1.0 for 60 years of plant operation for the surge line and pressurizer lower head. The applicant further indicated that stress-based fatigue monitoring of the surge line and lower pressurizer will be used to ensure that the fatigue usage of these components remains less than 1.0. The staff finds that the applicant has adequately addressed Renewal Applicant Action Item 1 of WCAP 14574-A, by evaluating the fatigue-sensitive subcomponents for insurge/outsurge transients, considering the effects of the reactor water environment, and assuring that the thermal transients that are significant contributors to the design fatigue usage of RCS components will be monitored by the FMP.

The applicant indicated that components other than the RCBP were designed to ASME Class 2 and 3, ANSI B31.7 Class 2 and 3, and ANSI B31.1. The codes and standards for ASME Class 2 and 3, ANSI B31.7 Class 2 and 3, and ANSI B31.1 components require that a stress-reduction factor be applied to the allowable thermal bending stress range if the number of full-range cycles exceeds 7,000. The applicant indicated that piping systems within the scope of license renewal are bounded by the 7,000 cycles for 60 years of plant operation. On the basis of the information provided by the applicant, the staff finds that these analyses remain valid for the period of extended operation in accordance with 54.21(c)(1)(i).

The applicant indicates that the FMP will continue during the period of extended operation and will assure that the design cycle limits are not exceeded. The applicant’s FMP tracks design transients and cycles that are significant contributors to the fatigue usage of RCS components to assure that these components remain within their design basis. GSI-166, “Adequacy of the Fatigue Life of Metal Components,” raised concerns regarding the conservatism of the fatigue curves used in the design of the RCS components. Although GSI-166 was resolved for the current 40-year design life of operating components, the staff identified GSI-190, “Fatigue Evaluation of Metal Components for 60-year Plant Life,” to address license renewal. The NRC closed GSI-190 in December 25, 1999 (see Appendix D, Reference 17), concluding:

> The results of the probabilistic analyses, along with the sensitivity studies performed, the iterations with industry (NEI and EPRI), and the different approaches available to the applicants to mange the effects of aging, lead to the conclusion that no generic regulatory action is required, and that GSI-190 is closed. This conclusion is based primarily on the negligible calculated increases in core damage frequency in going from 40- to 60-year lives. However, the calculations supporting resolution of this issue, which included consideration of environmental effects, and the nature of age-related degradation indicate the potential for an increase in the frequency of pipe leaks as plants continue to operate. Thus, the staff concludes that, consistent with existing requirements in 10 CFR 54.21, applicants should address the effects of coolant environment on component fatigue life as aging management programs are formulated in support of license renewal.

The applicant indicated that it evaluated the effects of the reactor water environment on the fatigue life of six component locations. These six component locations are equivalent to the component locations identified in NUREG/CR-6260 for a newer vintage Westinghouse plant. The staff finds these acceptable locations for evaluating the effects of the reactor water environment on the fatigue life of components.

The results of the applicant's evaluation are presented in Table 4.3-3 of the LRA. The staff compared the applicant's calculated fatigue usage factors with those listed in NUREG/CR-6260 for a newer vintage Westinghouse reactor. The applicant's calculated fatigue usage factors were comparable to those listed in NUREG/CR-6260 with the exception of the surge line. The applicant's design usage factor is much lower than the usage factor reported in NUREG/CR-6260.

The applicant submitted the results of an evaluation of the surge line to the NRC in response to NRC Bulletin 88-11 (reference 4.8-36 of the LRA). The submittal indicated that the maximum calculated fatigue usage for the surge line at the RCS hot-leg nozzle was 0.434. This usage factor is more in line with the design value listed in NUREG/CR-6260. However, Table 4.3-3 of the LRA indicates that the maximum design fatigue usage for the surge line is 0.0796. In RAI 4.3.1-2, the staff requested the applicant provide the basis for the usage factor report in Table 4.3-3 of the LRA.

The applicant's December 3, 2004, response indicated that the original CUF for the hot-leg nozzle, based on the number of design cycles, was 0.434. The applicant indicated that the value listed in LRA Table 4.3-3 is the projected 60-year fatigue usage based on an evaluation using the data obtained from stress-based fatigue monitoring at Millstone Unit 3. The staff finds that the applicant's response adequately clarifies the basis for the CUF reported in Table 4.3-3 of the LRA.

The applicant's evaluation indicated that the calculated usage factors may exceed 1.0 for four components: the surge line, the charging nozzle, the safety injection nozzle, and the RHR piping. The applicant committed to manage the fatigue of these components with the FMP for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

The applicant's FMP is discussed in the LRA. The applicant indicated that the program is consistent with the aging management program (AMP) provided in NUREG-1801, Section X.M1, "Metal Fatigue of the Reactor Coolant Pressure Boundary." The AMP requires that the usage factor, including environmental effects, be maintained below 1.0 during the period of extended operation. The program requires that corrective actions be taken to prevent the usage factor from exceeding 1.0 during the period of extended operation. Acceptable corrective actions include the following:

- further refinement of the fatigue analysis
- repair of the affected locations
- replacement of the affected locations

The program also requires that additional component locations be reviewed if the usage factor is projected to exceed 1.0. The staff finds that the applicant's FMP, which is consistent with NUREG-1801, provides an acceptable approach to address environmental fatigue of the surge line, the charging nozzle, the safety injection nozzle, and the RHR line for the period of extended operation in accordance with 10 CFR 54.21(c)(1).

4.3B.3 FSAR Supplement

The applicant provided an FSAR supplement description of the FMP in Section A4.2 of the LRA and a description of its TLAA evaluation for metal fatigue analysis in Section A3.2 of the LRA. On the basis of its review of the FSAR supplement, the staff concludes the summary description of the applicant's actions to address metal fatigue of components is adequate.

4.3B.4 Conclusion

The staff has reviewed the applicant's metal fatigue TLAA and concludes that the applicant's actions and commitments satisfy the requirements of 10 CFR 54.21(c)(1).

The staff has also reviewed the Millstone FSAR supplement for the TLAA and finds that the FSAR supplement contains an adequate description of the metal fatigue of components to satisfy 10 CFR 54.21(d).

4.4 Environmental Qualification

The 10 CFR 50.49 environmental qualification (EQ) program has been identified as a TLAA for the purposes of license renewal. The TLAA of EQ electrical components includes all long-lived, passive and active electrical components and instrumentation and controls (I&C) components that are important to safety and located in a harsh environment. The harsh environments of the plant are those areas that are subjected to environmental effects by a loss-of-coolant accident (LOCA) or a high-energy line break (HELB). The EQ equipment comprises safety-related and Q-list equipment; non-safety-related (NSR) equipment, the failure of which could prevent satisfactory accomplishment of any safety-related function; and necessary post-accident monitoring equipment.

As required by 10 CFR 54.21(c)(1), the applicant must provide a list of EQ TLAAs in the LRA. The applicant shall demonstrate that one of the following is true for each type of EQ equipment (i) the analyses remain valid for the period of extended operation, (ii) the analyses have been projected to the end of the period of extended operation, or (iii) the effect of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.4.1 Summary of Technical Information in the Application

The applicant provided in LRA Section 4.4, "Environmental Qualification of Electric Equipment," the following information:

The electrical equipment qualification (EEQ) program is an integral part of the design, construction, and operation of nuclear power generating stations. A description of this program and a comparison of the program to the guidance of NUREG-1801 is provided in each LRA Appendix B, Section B3.1, Electrical Equipment Qualification.

Part 50 of 10 CFR requires that certain categories of systems, structures and components (SSCs) be designed to accommodate the effects of both normal and accident environmental conditions, and that design control measures be employed to ensure the adequacy of these designs. Specific requirements pertaining to the environmental qualification (EQ) of these categories of electrical equipment are embodied in 10 CFR 50.49. The categories include safety-related (Class 1E) electrical equipment, non-safety-related electrical equipment whose failure could prevent the satisfactory accomplishment of a safety function by safety-related equipment, and certain post-accident monitoring equipment. As required by 10 CFR 50.49, electrical equipment not qualified for the current license term is to be refurbished, replaced, or have its qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for electrical equipment that specify a qualification of 40 years or greater are considered to represent a TLAA. Unit modifications, such as the installation or removal of equipment, systems, or non-identical replacement of existing components, are evaluated to ensure compliance with 10 CFR 50.49. Changes to system geometry (e.g., a piping addition or rerouting), system and equipment operational changes, environmental changes (e.g., baseline changes in temperature or radiation levels), and setpoint changes can affect the continued acceptability of existing aging evaluations. These changes are evaluated through the design control process. Electrical equipment aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpectedly adverse or harsh conditions are identified (e.g., during normal operation or maintenance activities) that could affect the qualification of a component, the affected component is evaluated and appropriate corrective actions taken (e.g., addition of shielding, equipment qualification zone changes, or changes to the qualification bases). Plant modification and events that impacted temperature and radiation values that were used in the underlying assumptions in the equipment qualification calculations have been reviewed in the Operating Experience section of each LRA Appendix B, Section B3.1, Electrical Equipment Qualification.

4.4.2 Staff Evaluation

The staff reviewed the information in Section 4.4 and Appendix B, Section B3.1 of each LRA to determine whether the applicant has demonstrated that the effects of aging on the intended function(s) of electrical components will be adequately managed through the MPS EQ program, together with other plant programs/processes, during the period of extended operation as required by 10 CFR 54.21(c)(1)(iii). Based on the applicant's statement that the EQ program is consistent with Section X.E1 of the GALL report, the staff concludes that the MPS EQ program will adequately manage the effects of aging on the intended function(s) of electrical components for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

Millstone uses the value of greater than 10^4 rads to define a harsh radiological environment for equipment qualification purposes. The fact that certain areas of the B train auxiliary feedwater pump room could exceed 10^5 rads means that this room must be considered to be a harsh radiological environment for the purpose of equipment qualification, unless certain areas can be expected to experience local doses of less than or equal to 10^4 rads. In that case, the room can be considered to be a generally harsh environment, with locally mild environments. Whatever the radiation field is at any location within the room, the equipment in that room must be designed to withstand the environment that it is expected to experience, such that it will perform its intended function during and following a design-basis accident (as specified in the FSAR).

In the case of the Target Rock valve controllers, it was demonstrated, through analysis, that the area in which they are located is not expected to exceed the 4.2×10^3 rads assumed for their qualification. Therefore, even though the room is deemed to be a generally harsh environment, since the Target Rock valve controllers are expected to be in a locally mild environment of ≤ 4.2

X 10^3 rads, they are expected to be able to perform their intended function during and following a design-basis accident.

Sections A3.3 and A4.1 of Appendix A to the LRA contain the applicant's FSAR supplement for the EQ program as an AMP and TLAA for license renewal. The staff reviewed this section and finds that the program description is consistent with the material contained in Sections 4.4 and B3.1 of the LRA. The staff finds that the FSAR supplement provides an adequate summary of the program activities as required by 10 CFR 54.21(d).

4.4.3 Conclusion

The staff has reviewed the information in each Section 4.4 and Appendix B, Section B3.1 of the LRAs. On the basis of this review, the staff concludes that the applicant has demonstrated that it can adequately manage the effects of aging on the intended function(s) of electrical components that meet the definition for TLAA, as defined in 10 CFR 54.3, during the period of extended operation, as required by 10 CFR 54.21(c)(1)(iii). In addition, the staff concluded that the FSAR supplement contains an adequate summary description of the programs and activities for the evaluation of TLAAs for the period of extended operation, as required by 10 CFR 54.21(d).

4.5 Concrete Containment Tendon Prestress

4.5.1 Summary of Information in the Application

The Millstone Unit 2 containment consists of a pre-stressed, reinforced concrete cylinder and dome, and a flat, reinforced concrete mat foundation supported on unweathered bedrock. The cylindrical portion of the containment is prestressed by a post-tensioning system composed of horizontal and vertical tendons, with the horizontal tendons placed in three 240-degree systems that use three buttresses as support for the anchorages. The dome has a three-way post tensioning system. Prestress on the containment tendons is expected to decrease over the life of the unit as a result of such factors as elastic deformation, creep and shrinkage of concrete, anchorage seating losses, tendon wire friction, stress relaxation, and corrosion.

The applicant stated that the evaluation of containment tendon examination and surveillance test results involved the use of time-limited assumptions such as corrosion rates, losses of tendon prestress, and changes in material properties. Regression analysis incorporating the most recent 25-year containment tendon surveillance results are provided in Tables 4.5-1, 4.5-2, and 4.5-3. These results and projections beyond 25 years are compared to design minimum requirements and the bounding 60-year, 95-percent confidence value in Figure 4.5-1. Confidence values were developed using a standard deviation that had been derived from the appropriate dome, horizontal, and vertical tendon data set. The applicant indicated that the containment tendon examinations are performed in accordance with Millstone Unit 2 technical specification requirements, and that its evaluation meets the requirements of 10 CFR 54.3. As such, the applicant concludes that the evaluation represents a TLAA.

Based on the above discussion, the applicant concluded that consistent with 10 CFR 54.21(c)(1)(ii), acceptable losses in containment tendon prestress have been projected to the end of the period of extended operation.

The Unit 3 LRA states that the Millstone Unit 3 containment is a subatmospheric cylindrical reinforced concrete structure designed without the use of prestressed tendons. Therefore, loss of prestress is not applicable to this containment.

4.5.2 Staff Evaluation

The design of the Unit 3 containment does not use prestressed tendons so this TLAA section is not applicable to Unit 3. The applicant provided the results of its regression analysis from the measured data and smooth projected curves for each group of tendons in Unit 2. However, the methodology used to arrive at the trends appears to be quite different from the method used by other applicants. To obtain clarification on the various steps involved in arriving at the projected trend lines, the staff requested the following information:

In RAI 4.5-1, the staff noted that the TLAA description included a number of time-limited assumptions, such as corrosion rates, losses of tendon prestress, and changes in material properties that have been utilized in performing the analysis. The applicant was requested to provide a quantitative summary of the corrosion rates, factors contributing to tendon prestress loss (e.g., creep, shrinkage, and relaxation of prestressing steel) and a factor related to change in material properties used in performing the analysis.

In response to RAI 4.5-1, in its letter of November 9, 2004, the applicant provided the following information:

> The evaluation of containment tendon examination and surveillance test results involves the use of time-limited assumptions. The Millstone Unit 2 tendon surveillance program consists of periodically inspecting the physical condition of a randomly selected group of tendons identified in accordance with Regulatory Guide 1.35. Visual and quantitative examinations are performed of the tendon sheathing filler material, anchorages, measurements of tendon liftoff forces (plus a visual assessment of stressing washers, shims, bearing plates), tensile testing of wire samples and corrosion assessments. Comparison of liftoff forces from the most recent tendon examinations to original installation lock-off forces provides direct evidence of potential system degradation.
>
> Containment tendon examination and surveillance test results can be found in the responses to RAI 4.5-5 (Figures 1, 2 and 3), RAI 4.5-6 (Tables 1, 2 and 3) and in RAI 4.5-7 (Table 1). These figures and tables include such quantitative tendon examination results as the actual and projected decreases in tendon group lock-off force, the presence or absence of free water, corrosion assessments, tensile testing results, and sheathing filler chemical analysis results. These inspection results reveal that the Millstone Unit 2 containment post tensioning system has experienced no abnormal degradation. Tendon lock off-force values were found to remain constant with projected lock-off forces (Millstone Unit 2 LRA, Section 4 – Figure 4.5-1) remaining above minimum requirements over the period of extended operation.

The applicant provided a description of examinations it performed and the factors it considered in performing the TLAA. As this response is associated with the responses to RAIs 4.5-5, 4.5-6, and 4.5-7, the staff position regarding the TLAA adequacy is discussed in the staff's evaluation of these RAIs.

In RAI 4.5-2, the staff requested a clarification of the prestressing force values provided in the second column of Tables 4.5-1, 4.5-2, and 4.5-3. The staff noted that the lowest required prestressing force for each group of tendons was established based on the computations of the minimum requirement to counteract the tension produced due to specified internal pressure. The tendon spacing is typically based on the tendon lock-off forces minus the estimates of losses due to anchorage take-up, elastic shortening, time dependent losses, and losses due to friction. The staff questioned whether it is feasible to account for all these factors and end up with the same minimum required tendon force (1308 kips) at tendon anchorages for hoop, vertical, and dome tendons. The applicant was requested to provide the basis for establishing the minimum required forces along with a comparison against the measured prestressing forces.

In its letter dated December 3, 2004, the applicant provided the following information in response to RAI 4.5-2:

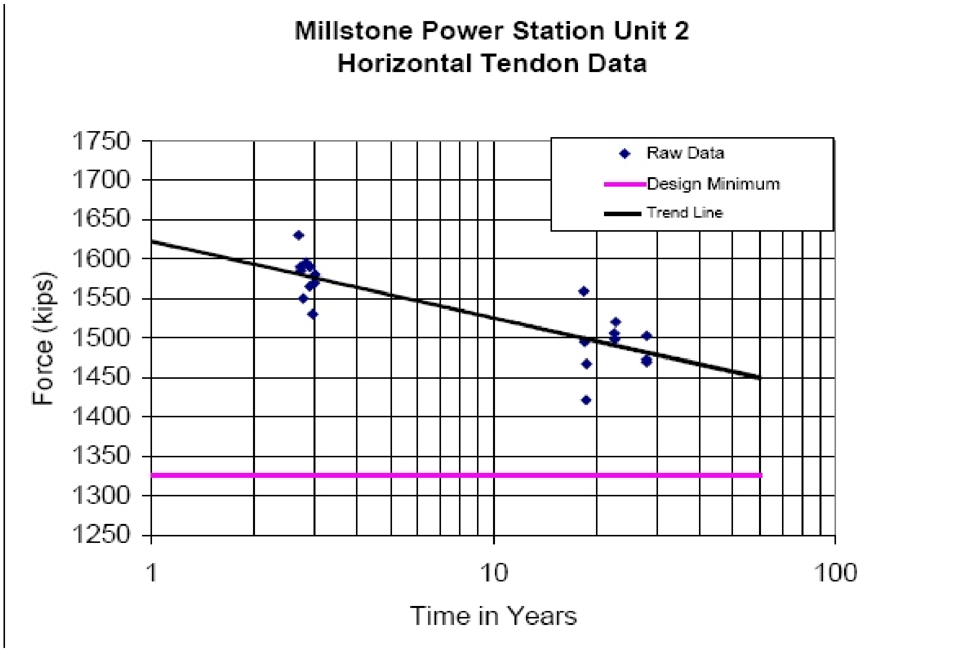
> The Millstone Unit 2 containment is pre-stressed by a post-tensioning system composed of dome, vertical and horizontal (hoop) tendon groups.
>
> Each tendon consists of approximately 186 stabilized, low relaxation 0.250-inch diameter wires, each having a tensile strength of 240,000 psi. The design of the post tensioning system takes into consideration a number of factors including tendon spacing, steel relaxation, stress losses due to concrete creep, steel elasticity, number of tendon wires and variability in same tendon load readings. Taking these variables into consideration, Dominion originally used a value of 1308 kips for the minimum pre-stress forces (Millstone Unit 2 LRA, Section 4 – Tables 4.5-1, -2 and -3, and Figure 4.5-1) as a nominal value considered to represent a bounding pre-stress force for all three tendon groups. However, based on a conversation with the reviewer, Dominion decided to determine the actual values for the Millstone Unit 2 containment dome, vertical and horizontal (hoop) tendon groups, which are 1343 kips, 1339 kips and 1325 kips respectively.
>
> As presented in the responses to RAI 4.5-4 (Figures 1, 2 and 3) and RAI 4.5-5 (Figures 1, 2 and 3), projected lockoff forces (Millstone Unit 2 LRA, Section 4 – Figure 4.5-1) remain above minimum requirements over the period of extended operation.

In view of the magnitudes of tendon forces in dome, vertical, and hoop directions, the staff considers the revised values provided for the minimum required prestress forces acceptable.

In RAI 4.5-4, the staff noted that the number of tendons sampled (i.e., 4 percent and 2 percent of the population of the group of tendons) during each tendon inspection is small, and that the sample size is not amenable to statistical analysis for establishing confidence levels (column 3 of Tables 4.5-1, 4.5-2, and 4.5-3) during each inspection based on the measured results. The staff also pointed out that, as the sample size of each tendon inspection is small, Attachment 3 of NRC Information Notice 99-10, Revision 1, recommended regression analysis of the measured tendon forces without averaging or any statistical calculation. The applicant was requested to provide more information about the values in column three of the identified tables and an explanation of measured tendon force values used in the regression analysis.

In its January 11, 2005 response, the applicant removed the tables provided in the LRA, and substituted new tables showing measured prestressing forces during tendon inspections for each group of tendons. In response to the staff's follow-up question as to why 3-, 5-, and 10-year data are missing from the tables, the applicant stated that as these tendons went through repeated tensioning and detensioning, the data were not reliable. The measurements taken during the 1-, 15-, 20-, and 25-year inspections were used for developing the trend lines. In Figures 1, 2, and 3 of the revised response (dated January, 11 2005), the applicant provided the trend lines and the measured tendon force data. Figure A, showing the trend line related to horizontal tendons, is reproduced below:

Figure A: Trend Line Relationship with Horizontal Tendons



In RAI 4.5-5, the staff noted that the process used by license renewal applicants with respect to prestressed concrete containments is to assume that the tendon force varies with the logarithm of time (as discussed in RG 1.35.1). The staff indicated that it was not apparent in Figure 4.5-1 what functional relationship had been assumed between the two variables. The applicant was requested to provide additional information regarding the process used in arriving at the trending curves shown in Figure 4.5-1.

In its response, in a letter dated January 11, 2005, the applicant confirmed that it is using procedures for monitoring and trending prestressing force consistent with the recommendations in RG 1.35.1 and NRC Information Notice 99-10. Therefore, the staff finds the process acceptable, as the use of RG 1.35.1 for estimating the target prestressing forces, and Information Notice 99-10 for projecting the actual measured prestressing forces (as illustrated in the figure above), provides the elements needed for an adequate TLAA.

In RAI 4.5-6, the staff noted that Section 5.9.3.3.4 of the Millstone Unit 2 FSAR indicates that 16 (below grade) horizontal tendons were identified to have ground water intrusion. The FSAR also indicates that the corrosion protection medium is continuously supplied to these tendons at a pressure slightly above the hydrostatic pressure to prevent intrusion of ground water. The staff also noted that Appendix 5F of the FSAR indicates that the below-grade portions of about 70 vertical tendons have been subjected to ground water intrusion. Appendix 5F also describes the attempts made to reduce the potential of corrosion of the components of these tendons.

The staff indicated that, due to the unusual maintenance conditions of these tendons, they are likely to experience greater age-related degradation (corrosion of wires, corrosion of anchorage components, etc.) than other tendons. The applicant was requested to provide the following information related to these tendons:

- During periodic inspections, are the samples from these tendons selected for special inspection and lift-off testing?
- Which tendons are included in the samples used in Tables 4.5-2 and 4.5-3?
- For the affected tendons, please provide a summary of the results of inspections performed in accordance with IWL-2523.

In its November 9, 2004, response, the applicant stated that it was using Section XI Inservice Inspection Program (Subsection IWL), and that it had not selected special tendons from the tendons subjected to ground water intrusion in the inspection samples. The applicant provided tables of tendons selected for examinations during various inspections, and conditions of the tendon hardware, sampled wires, chemical properties of corrosion protection medium (e.g., chlorides, nitrates, sulfides), and amount of free water in the grease samples tested. Three hoop tendons and one vertical tendon which had experienced water intrusion were included for examinations. The anchor heads and bearing plates of these tendons indicated visible oxide during 15, 20, and 25 years of inspections. The amount of free water increased from 15 to 20 years. However, during the 25-year inspection, the free water content decreased from 62 oz to 22 oz. The wire samples tested from these tendons indicated no difference in their strengths and percentage elongation compared to other tendons.

The staff finds that though the applicant is not including specific tendons that are subjected to ground water intrusion in its inspection samples, its random sample process incorporates these tendons, and it is monitoring the condition of suspect tendons during subsequent examinations. The TLAA is based on the force measurements taken on the randomly selected tendons. Therefore, the staff finds the applicant’s approach in monitoring the conditions of the affected tendons acceptable.

In RAI 4.5-7, the staff noted that Section A3.4 of the Millstone 2 FSAR supplement provides only a general summary of the TLAA. Table 4.5-1 of NUREG-1800 recommends a discussion of trend lines and predicted lower limit (PLL) in the FSAR supplement. In order for the summary to be meaningful, the applicant was requested to provide a table showing the minimum required prestressing forces and the projected (to 60 years) prestressing forces for each group of tendons. The staff indicated that the tabulated values will confirm the validity of the analysis results based on the inspections conducted during the period of extended operation. The applicant was requested to supplement this information in Section A3.4 of the FSAR supplement.

In its response dated January 11, 2005, the applicant proposed to incorporate Table 1 (as reproduced below), in Millstone Unit 2 FSAR supplement.

Table 1 Millstone Power Station Unit 2 Containment Tendon Prestress

Inspection Year	Dome Tendon Projected (kips)	Dome Minimum Value (kips)	Vertical Tendon Projected (kips)	Vertical Minimum Value (kips)	Horizontal Tendon Projected (kips)	Horizontal Minimum Value (kips)
40	1453	1343	1521	1339	1467	1325
60	1435	1343	1509	1339	1449	1325

With the inclusion of this table, the staff finds the information in Section A3.4 of the FSAR supplement acceptable, as the table provides the necessary information for comparing the results of the inspections that will be performed during the period of extended operation.

4.5.3 Conclusion

On the basis of the review of this section of the LRAs and RAI responses, the staff concludes that the TLAA performed in accordance with 10 CFR 54.21(c)(1)(ii) is acceptable, and there is a reasonable assurance that in conjunction with the aging management of the containment structure to be performed in accordance with the aging management program described in LRA Appendix B, Section B2.1.16, the Millstone 2 containment will be able to perform its intended function during the period of extended operation.

4.6 Containment Liner Plate and Penetration Fatigue Analyses

4.6A Unit 2 Containment Liner Plate and Penetration Fatigue Analyses

The interior surface of the concrete containment structure is lined with thin metallic plates to provide a leak-tight barrier against the uncontrolled release of radioactivity to the environment, as required by 10 CFR Part 50. The thickness of the liner plates is generally between 1/4 inch (6.2 mm) and 3/8 inch (9.5 mm). The liner plates are attached to the concrete containment wall by stud anchors or structural rolled shapes, or both. The design process assumes that the liner plates do not carry loads. However, normal loads, such as from concrete shrinkage, creep, and thermal changes, imposed on the concrete containment structure, are transferred to the liner plates through the anchorage system. Internal pressure and temperature loads are directly applied to the liner plates. Thus, under design-basis conditions, the liner plates could experience significant strains.

Fatigue of the liner plates may be considered in the design based on an assumed number of loading cycles for the current operating term. The cyclic loads include reactor building interior temperature variation during the heatup and cooldown of the reactor coolant system, a loss-of-coolant accident (LOCA), annual outdoor temperature variations, thermal loads due to high-energy containment penetration piping lines (such as steam and feedwater lines), seismic loads, and pressurization due to periodic Type-A integrated leak rate tests.

The containment liner plates, penetration sleeves (including dissimilar metal welds), and penetration bellows may be designed in accordance with the requirements of Section III of the ASME Boiler and Pressure Vessel Code. If a plant's code of record requires a fatigue analysis, then this analysis may be a TLAA and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions will be adequately managed for the period of extended operation.

The adequacy of the fatigue analyses of the containment liner plates (including welded joints), penetration sleeves, dissimilar metal welds, and penetration bellows is reviewed for the period of extended operation. The fatigue analyses of the pressure boundary of process piping are reviewed in Section 4.3A of this SER, following the guidance in Section 4.3 of the SRP-LR.

4.6A.1 Summary of Technical Information in the Application

The applicant discussed the evaluation of the containment liner in Section 4.6.1 of the LRA. The applicant indicated that the following loads were considered in the design of the liner plate:

- 40 cycles of outdoor temperature variation
- 500 cycles of temperature variation due to startups and shutdowns
- 1 design-basis accident thermal cycle

The applicant discussed the evaluation of the containment penetrations in Section 4.6.2 of the LRA. The applicant indicated that the containment penetrations were fabricated, installed, inspected, and tested in accordance with Section III of the ASME Code and ANSI B31.7. The applicant indicated that the number of cycles used for the design of the containment liner plate penetrations was evaluated and found to be acceptable for the period of extended operation.

The applicant concluded that the fatigue analysis of the containment liner plate and penetrations have been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

4.6A.2 Staff Evaluation

The design of the liner plate is discussed in Section 5.2.4 of the FSAR. The FSAR indicates that the analysis of the liner plate was performed in accordance with the criteria specified in Section III of the ASME Code, 1968 edition. The staff confirmed that the design cycles identified by the applicant in Section 4.6.1 of the LRA are the same as those specified in FSAR Section 5.2.4 for the fatigue analysis of the liner plate. In a followup response (e-mail dated December 20, 2004, from W. Watson (MPS) to J. Eads (NRC)), the applicant indicated that the number of design cycles was multiplied by 1.5 to demonstrate that the fatigue design of the liner is acceptable for 60 years of operation. Table 4.3-2 of the LRA indicates that the 500 heatup and cooldown cycles assumed for the fatigue design of RCS components should be bounding for the period of extended operation; therefore, the applicant used a conservative estimate for the number of startup and shutdown cycles. The staff concludes that the applicant's use of the 1.5 factor to extrapolate the number of design load cycles from 40 to 60 years of plant operation is acceptable. The staff finds the applicant has performed an acceptable assessment regarding the fatigue life of the liner plate for the period of extended operation, pursuant to 10 CFR 54.21(c)(1)(ii).

The design of the containment penetrations is discussed in Section 5.2.7 of the FSAR. The FSAR indicates that the penetrations were fabricated, installed, inspected, and tested in accordance with Section III of the ASME Code and ANSI B31.7 as indicated by the applicant. The applicant indicated that the number of cycles used in the design of the containment penetrations was found acceptable for the period of extended operation. The staff finds the applicant has performed an acceptable assessment regarding the fatigue life of the containment penetrations for the period of extended operation, pursuant to 10 CFR 54.21(c)(1)(i).

4.6A.3 FSAR Supplement

The applicant provided an FSAR supplement description of its TLAA evaluation for containment liner plate and penetration fatigue analyses in Section A3.5 of the LRA. On the basis of its review of the FSAR supplement, the staff concludes the summary description of the applicant's actions to address metal fatigue of components is adequate.

4.6A.4 Conclusion

The staff has reviewed the applicant's TLAA of the containment liner and penetrations and concludes the applicant's actions satisfy the requirements of 10 CFR 54.21(c)(1).

The staff has also reviewed the FSAR supplement for the TLAA and finds that the FSAR supplement contains an adequate description of the applicant's actions to address fatigue of the containment liner plate and penetrations to satisfy 10 CFR 54.21(d).

4.6B Unit 3 Containment Liner Plate and Penetration Fatigue Analyses

The interior surface of the concrete containment structure is lined with thin metallic plates to provide a leak-tight barrier against the uncontrolled release of radioactivity to the environment, as required by 10 CFR Part 50. The thickness of the liner plates is generally between 1/2 inch (12.7 mm) and 3/8 inch (9.5 mm). The liner plates are attached to the concrete containment wall by stud anchors or structural rolled shapes, or both. The design process assumes that the liner plates do not carry loads. However, normal loads, such as from concrete shrinkage, creep, and thermal changes, imposed on the concrete containment structure, are transferred to the liner plates through the anchorage system. Internal pressure and temperature loads are directly applied to the liner plates. Thus, under design-basis conditions, the liner plates could experience significant strains.

Fatigue of the liner plates may be considered in the design based on an assumed number of loading cycles for the current operating term. The cyclic loads include reactor building interior temperature variation during the heatup and cooldown of the reactor coolant system, a LOCA, annual outdoor temperature variations, thermal loads due to high-energy containment penetration piping lines (such as steam and feedwater lines), seismic loads, and pressurization due to periodic Type-A integrated leak-rate tests.

The containment liner plates, penetration sleeves (including dissimilar metal welds), and penetration bellows may be designed in accordance with the requirements of Section III of the ASME Boiler and Pressure Vessel Code. If a plant's code of record requires a fatigue analysis, then this analysis may be a TLAA and must be evaluated in accordance with 10 CFR 54.21(c)(1) to ensure that the effects of aging on the intended functions will be adequately managed for the period of extended operation.

The adequacy of the fatigue analyses of the containment liner plates (including welded joints), penetration sleeves, dissimilar metal welds, and penetration bellows is reviewed for the period of extended operation. The fatigue analyses of the pressure boundary of process piping are reviewed in Section 4.3B of this SER, following the guidance in Section 4.3 of the SRP-LR.

4.6B.1 Summary of Technical Information in the Application

The applicant discussed the evaluation of the containment liner in Section 4.6.1 of the LRA. The applicant indicated that ASME Section III and Section VIII, 1971 Edition were used in the design of the Millstone Unit 3 containment liner. The applicant indicated that the analysis of the containment liner plate has been projected to the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

The applicant discussed the evaluation of the containment penetrations in Section 4.6.2 of the LRA. The applicant indicated that Millstone Unit 3 penetrations consist of both sleeved and unsleeved piping penetrations, electrical penetrations, a fuel transfer tube, a personnel air lock, and the equipment hatch. The applicant stated there were no applicable codes for the design of concrete containment liners at the beginning of construction of Millstone Unit 3. The applicant indicated that ASME Section III, Division 1 and 2, and ASME Section VIII were used as guides. The applicant indicated that the containment liner plate and access openings, including the fuel transfer tube assembly, were designed for the following loads:

- 400 cycles of thermal expansions
- 100 cycles of differential pressure
- 100 cycles of 1/2-safe shutdown earthquake

The applicant stated that the analysis of the containment liner plate penetrations has been projected to the end of the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

4.6B.2 Staff Evaluation

The design of the liner plate is discussed in Section 3.8.1 of the Millstone Unit 3 FSAR. The FSAR indicates that the analysis of the liner plate conforms with the criteria specified in Section III of the ASME Code, 1971 edition through the 1973 summer addendum. The staff confirmed that the design cycles identified by the applicant in Section 4.6.1 of the LRA are the same as those specified in FSAR Table 3.8 for the fatigue analysis of the liner plate. In response (e-mail dated November 10, 2004, from W. Watson (MPS) to J. Eads (NRC)) to a staff question during an October 12, 2004, teleconference, the applicant indicated that the number of design cycles was multiplied by 1.5 to demonstrate that the fatigue design of the liner is acceptable for 60 years of operation. Table 4.3-2 of the LRA indicates that the 400 thermal cycles (heatup and cooldown cycles) should be bounding for the period of extended operation. The staff also finds the applicant's estimate of the number of cycles for differential pressure conservative based on the projected number of startup and shutdown cycles. Therefore, the staff concludes that the applicant used a conservative estimate of the number of load cycles for the period of extended operation. The staff finds the applicant has performed an acceptable assessment regarding the fatigue life of the liner plate for the period of extended operation, pursuant to 10 CFR 54.21(c)(1)(ii).

The design of the containment penetrations is also discussed in Section 3.8.1 of the Millstone Unit 3 FSAR. Table 3.8-2 of the FSAR indicates that the penetrations were evaluated using Section III, Class-1 or Class-2 criteria. The applicant indicated that the number of cycles used in the design of the containment penetrations was found acceptable for the period of extended operation. As discussed previously, the number of thermal and pressure cycles used in the evaluation of the containment penetrations should be bounding for the period of extended operation based on the information provided in LRA Table 4.3-2. Therefore, the staff finds the applicant has performed an acceptable assessment regarding the fatigue life of the containment penetrations for the period of extended operation, pursuant to 10 CFR 54.21(c)(1)(i).

4.6B.3 FSAR Supplement

The applicant provided an FSAR supplement description of its TLAA evaluation for containment liner plate and penetration fatigue analyses in Section A3.4 of the LRA.

4.6B.4 Conclusion

The staff has reviewed the applicant's TLAA of the containment liner and penetrations and concludes the applicant's actions and commitments satisfy the requirements of 10 CFR 54.21(c)(1).

The staff has also reviewed the FSAR supplement for the TLAA and finds that the FSAR supplement contains an adequate description of the applicant's actions to address fatigue of the containment liner plate and penetrations to satisfy 10 CFR 54.21(d).

4.7 Other Plant-Specific Time-Limited Aging Analyses

4.7A Unit 2 Other Plant-Specific Time-Limited Aging Analyses

4.7A.1 Crane Load Cycle Limit

4.7A.1.1 Summary of Technical Information in the Application

In LRA Section 4.7.1, the applicant identified the following examples of the types of cranes determined to be within the scope of license renewal. These cranes were designed in accordance with, or reconciled to, the guidance contained in NUREG-0612, "Control of Heavy Loads in Nuclear Power Plants."

- containment polar crane
- spent fuel crane
- monorails

NUREG-0612 requires that the design of heavy-load, overhead handling systems meets the intent of Crane Manufacturers Association of America, Inc., Specification No. 70 (CMAA-70).

Overhead cranes designed to CMAA-70 have an implicit fatigue design basis, equivalent to a limiting number of 100,000 load cycles. The Millstone Unit 2 polar crane was originally designed to the requirements of the Electric Overhead Crane (EOC) Institute Specification No. 61. This design was subsequently reconciled to the guidance contained in NUREG-0612.

As noted by the applicant, the most frequently used crane is the spent fuel crane. The spent fuel crane is expected to experience approximately 17,500 load cycles over a 60-year period for the movement of spent fuel from the reactor to the spent fuel pool. In addition, the crane is used in support of other activities including fuel shuffles and inspections. In supporting these uses, the spent fuel crane is expected to conservatively experience a total of 35,000 load cycles over a 60-year period. This number is well below the 100,000 load cycles allowed in CMAA-70.

4.7A.1.2 Staff Evaluation

The containment polar crane in Unit 2 was originally designed to the requirements of Electric Overhead Crane Institute Specification No. 61. Since this specification does not contain guidelines for fatigue evaluation, the applicant was requested in RAI 4.7.1-1 to explain how the crane was reconciled to the fatigue design basis of 100,000 load cycles as required by the CMAA-70.

In its response dated November 9, 2004, the applicant stated:

> In accordance with NUREG-0612, the load carrying parts of the polar crane, except for structural members and hoisting ropes, were designed such that the calculated static stress in the material, based on rated load, will not exceed 20% of the assumed average ultimate strength of the material. The Millstone Unit 2 polar crane was designed for a load of 578 tons (NRC to Northeast Nuclear Energy Company, Summary of Meeting of March 20, 1991, With Representatives of Northeast Utilities Concerning the Construction Aspects of the Millstone Unit 2 Steam Generator Replacement Project, Letter A09459 dated April 4, 1991), but the largest typical load, the pressure vessel head (including the associated weight of the lifting rig, CEDMs and CEDM coolers), is nominally 140 tons.
>
> The Millstone Unit 2 polar crane is used primarily during refueling outages. Assuming four load cycles per year (pressure vessel head removal and replacement plus other miscellaneous uses such as RCP motor movement) for a 60-year period of time, the polar crane would only experience a nominal 240 load cycles through the current and extended periods of operation. This number is significantly less than the 100,000 design load cycles (Millstone Unit 2 LRA Section 4.7.1).

The staff finds the applicant’s response reasonable and acceptable because the applicant has provided a satisfactory explanation for reconciling the design of the polar crane to the requirements of CMAA-70.

As noted by the applicant, the most frequently used crane is the spent fuel crane. This crane is projected to lift 35,000 load cycles over a 60-year period for Unit 2. The staff requested the applicant to provide the basis for arriving at this projected figure of 35,000 load cycles.

In its supplemental response to RAI 4.7.1-1 dated January 11, 2005, the applicant stated:

> The Millstone Unit 2 spent fuel pool crane is the most frequently used crane of those cranes within the scope of license renewal. As such, the spent fuel pool crane would experience the highest number of load cycles over the period of extended operation. The capacity of the Unit 2 spent fuel crane is 2,000 pounds. A fuel assembly with its associated rigging weighs approximately 1,500 pounds.
>
> Assuming full-core off-loads and subsequent reloading of the 217 fuel assemblies every 1.5 years, the spent fuel pool crane is expected to experience 17,360 lifts (or load cycles) over a 60-year period.
>
> 217 X 2 lifts/cycle X 1 cycle/1.5 years X 60 years = 17,360 lifts
>
> The crane is also used to support other activities including fuel shuffles and inspections. Considering all of these uses, the spent fuel pool crane is expected to conservatively experience a total of 35,000 lifts (i.e., 17,360 lifts X 2) over a 60-year period. This number is well below the allowable number of 100,000."

The staff finds the applicant's response reasonable and acceptable because the applicant has provided a satisfactory basis for determining the projected number of lifts.

Considering all the uses, the spent fuel crane is likely to experience a total of 35,000 load cycles over a 60-year period. This number is well below the design load cycles of 100,000, and therefore acceptable. A similar conclusion based on projected load cycles being well below the number of design load cycles is applicable for the other cranes within the scope of license renewal.

4.7A.1.3 FSAR Supplement

In Appendix A, Section A3.6.1 of the application, the applicant provided a summary description of the evaluation of the crane load cycle limit. The applicant stated that the load cycles for these cranes were evaluated for the period of extended operation. For each crane, the projected load cycles through the period of extended operation will be less than the design load cycles and, therefore, all cranes in the scope of license renewal will continue to perform their intended function throughout the period of extended operation. On the basis of staff's review, the staff concludes that the applicant's description is sufficient to satisfy the requirements of 54.21(d).

4.7A.1.4 Conclusion

The staff has reviewed the information in LRA Section 4.7.1 and Appendix A, Section A3.6.1, as well as the additional information provided in the applicant's responses to staff's request for additional information. On the basis of the review discussed above, the staff concludes that the applicant has provided adequate information to meet the requirements of 10 CFR 54.21(c)(1), option (ii) related to the TLAA for the crane load cycle limits.

4.7A.2 Reactor Coolant Pump Flywheel

4.7A.2.1 Summary of Technical Information in the Application

In Section 4.7.2 of the Millstone Unit 2 LRA, the applicant addresses its analysis of fatigue-crack initiation and growth for the reactor coolant pump (RCP) flywheel.

The RCP motors are provided with flywheels to increase rotational inertia, thus prolonging pump coast-down and assuring a more gradual loss of primary coolant flow to the core in the event that pump power is lost. During normal operation, the RCP flywheels develop sufficient kinetic energy to produce high-energy missiles in the event of failure. Conditions that may result in overspeed of the pump increase both the potential for failure and the kinetic energy of the flywheel. These concerns led the NRC to issue RG 1.14, "Reactor Coolant Flywheel Integrity," Revision 1, August 1975. One of the recommendations of RG 1.14 is to volumetrically inspect the flywheels at 3- and 10-year intervals.

The applicant stated that an evaluation was performed of the likelihood of flywheel failure over a 60-year period of operation, and a justification was developed for the relaxation of RG 1.14, Revision 1, Regulatory Position C.4.b(2). The NRC has reviewed and accepted the topical report SIR-94-080-A developed by Structural Integrity Associates, Inc., subject to certain conditions, for referencing in license applications. Using this evaluation, the NRC issued Amendment Number 264 for the Millstone Unit 2 RCP flywheel inspection frequency. The amendment allows Millstone Unit 2 to examine each reactor coolant pump flywheel at least once every 10 years, coinciding with the ASME Section XI inservice inspection program.

The applicant concluded that the evaluation of the reactor coolant pump flywheels represents a time-limited aging analysis per 10 CFR 54.3 since it involves the use of time limited assumptions such as thermal cycles and crack growth rates. Consistent with 10 CFR 54.21(c)(1)(iii), the applicant concluded that the RCP flywheel fatigue will be adequately managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.

4.7A.2.2 Staff Evaluation

In Section 4.7.2 of the Millstone Unit 2 LRA, the applicant describes an analysis of fatigue-crack initiation and growth for the RCP flywheel. The staff reviewed this section to determine whether the applicant provided adequate information to meet the requirements of 10 CFR 54.21(c)(1), as the information relates to the TLAA for the RCP flywheel.

To reduce the RCP flywheel inspection frequency, Millstone Unit 2 submitted an amendment to its TS in a letter dated April 26, 2001. The amendment justification referenced the topical report SIR-94-080A, "Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements," which was approved by the NRC with certain conditions. The conditions are specified in the NRC's SER dated May 21, 1997. The crack growth calculations were based on an assumed 4,000 cycles of RCP startups and shutdowns rather than a specific time period of operation. The LRA states that the number of cycles from actual plant operating conditions through the end of the period of extended operation is expected to be much less that the assumed 4,000 cycles.

In RAI 4.7.2-1, the staff requested that the applicant discuss how crack growth rates and the number of start/stop cycles used in SIR-94-080A are applicable to the period of extended operation. In the applicant's response to RAI 4.7.2-1, dated December 3, 2004, the applicant states that a flaw tolerance evaluation using linear elastic fracture mechanics principles was performed using lower bound fracture toughness values at the most highly stressed locations. A crack growth evaluation was performed using the ASME Section XI crack growth law for ferritic steel in an air environment with an assumed initial flaw size of 0.25 inches (ultrasonic testing detection uncertainty). The crack growth after 4000 startup/shutdown cycles (this value is significantly more than expected for the period of extended operation) was found to be minimal (0.0035 inches) resulting in a final flaw size of 0.2535 inches. This final flaw size is significantly below the calculated ASME Section XI, paragraph IWB-3610 allowable flaw size of 1.64 inches for normal operating speed and 2.0 inches for accident speed conditions. Millstone Unit 2 is expected to experience a total of 300 RCP startup/shutdown cycles, including the period of extended operation.

The applicant's fatigue-crack growth analysis for the RCP flywheels demonstrates that the postulated flaw is not expected to grow in excess of the critical crack-size, even when the flywheels have been subjected to the change in the stress-intensity factor for the flywheels associated with 4,000 RCP startup/shutdown cycles. Since this bounds the number of RCP startups/shutdown cycles assumed for both the current operating period and the proposed period of extended operation, the staff concludes that the fatigue-crack growth analysis for the RCP flywheels meets the acceptance criterion for TLAAs in 10 CFR 54.21(c)(1)(ii), in that the analysis remains bounding for the period of extended operation.

4.7A.2.3 FSAR Supplement

Section A3.6.2 of Appendix A to the LRA provides the applicant's FSAR supplement regarding RCP flywheel consistent with the staff's evaluation discussed in Section 4.7.2.2 of this SER. The FSAR supplement summary description for the TLAA on the RCP Flywheel is therefore acceptable to the staff, and satisfies the criterion for FSAR supplement summary descriptions in 10 CFR 54.21(d).

4.7A.2.4 Conclusion

Based on its review, the staff concludes that the applicant has provided an acceptable demonstration pursuant to 10 CFR 54.21(c)(1)(ii) that, for the TLAA on the RCP flywheel, the analysis remains valid for the period of extended operation.

The staff also concludes that the FSAR supplement contains an adequate summary description of this TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7A.3 Reactor Coolant Pump Code Case N–481

4.7A.3.1 Summary of Technical Information in the Application

In Section 4.7.3 of the Millstone LRA, the applicant concluded that the use of ASME Code Case N–481 for Millstone Units 2 and 3 for evaluating the reactor coolant pump (RCP) casing met the definition in 10 CFR 54.3 for a TLAA, since it involves the use of time-limiting assumptions such as thermal cycles and crack growth rates. The applicant concluded that the use of ASME Code Case N–481 for the RCP casing welds at the Millstone units were TLAAs that needed to be assessed against the acceptance criteria of 10 CFR 54.21(c)(1). The applicant provided the following assessment for the TLAA on the ASME Code Case N–481:

> Millstone, Unit 2
> ASME Boiler and Pressure Vessel Code, Section XI, specifies that a volumetric inspection of the reactor coolant pump casing welds and a visual inspection of pump casing internal surfaces be performed on a reactor coolant pump within each 10-year inspection period. These 10-year volumetric inspections are significant because the reactor coolant pumps have already been welded to the piping and the pumps must be disassembled in order to gain access to the inside surface of the cast stainless steel casings. In recognition of these difficulties, ASME Code Case N–481, Alternative Examination Requirements for Cast Austenitic Pump Casings, was developed to allow for the replacement of volumetric examinations with [a] fracture mechanics, based evaluation and supplemented by specific visual inspections. The NRC, with no supplemental requirements or conditions, has approved Code Case N–481 for use at Millstone Unit 2.
>
> The evaluation of reactor coolant pump casings represents a time-limited aging analysis per 10 CFR 54.3 since it involves the use of time limited assumptions such as thermal cycles, and crack growth rates. Consistent with 10 CFR 54.21(c)(1)(iii), acceptable reactor coolant pump casing will be managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.
>
> Millstone, Unit 3
> The Millstone Unit 3 Mode 93A-1 reactor coolant pump casings are single castings, which contain no welds. Therefore, Code Case N–481, Alternative Examination Requirements for Cast Austenitic Pump Casings, is not applicable.

4.7A.3.2 Staff Evaluation

Cast austenitic stainless steel (CASS) RCP casings are subject to thermal aging. Thermal aging refers to the gradual change in the microstructure and properties of a susceptible material due to its exposure to elevated temperatures for an extended period of time. Thermal aging may result in a reduction of the fracture toughness of a susceptible material such as CASS, since the thermal aging embrittlement effect (loss of fracture toughness) is a time-dependent phenomena. The associated aging effect requires a TLAA to ensure that it will be adequately managed through the period of extended operation.

ASME Code Case N–481 was approved by the NRC staff in RG 1.147, Revision 13, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1,” to allow the use of visual inspections and a postulated flaw evaluation in lieu of the volumetric examinations of the cast austenitic RCP casings welds as required by Table IWB-2500-1, Examination Category B-L-1, Item B12.10 of the ASME Code, Section XI. The purpose of the flaw analysis is to support the application of ASME Code Case N–481 for the inservice inspection (ISI) examination of the RCP casing welds. The requirements of Table IWB-2500-1, Examination Category B-L-2, Item B12.20 of the ASME Code, Section XI to perform internal visual inspections of the internals of the pump casing still apply.

Since the Millstone Unit 3 RCP casings are single castings, which contain no welds, ASME Code Case N–481 does not apply. Therefore, this is not a TLAA for Millstone Unit 3, and no further evaluation for Millstone Unit 3 is necessary.

For Millstone Unit 2, the RCP casings have welds, and therefore the use of ASME Code Case N–481 applies and is required to be evaluated as a TLAA since it uses time limiting assumptions such as thermal cycles and crack growth rates. However, the applicant did not provide the postulated flaw analysis required by the code case for the period of extended operation. In RAI 4.7.3-1(a), the staff requested the applicant to submit this fracture mechanics evaluation for the period of extended operation. In addition, the applicant was requested to compare the crack growth for the extended period to that originally predicted for the current operating period, and provide the basis for concluding that this additional crack growth still allows the continued application of ASME Code Case N–481.

In response to RAI 4.7.3-1(a), in a letter dated December 3, 2004, the applicant stated that a fracture mechanics evaluation, performed as a part of a Combustion Engineering Owners Group CEN-412, Revision 2, Supplement 2 activity, has been performed for the Millstone Unit 2 reactor coolant pumps. The applicant also stated that for Millstone Unit 2, the limiting end-point crack size is 0.39t, significantly greater than the 1/4t flaw postulated in ASME Code Case N–481. The time for the Millstone Unit 2 reactor coolant pump casing to reach the limiting end-point crack size is 103 years. To confirm the methodology and fracture mechanics results, the staff requested that the applicant provide the fracture mechanics evaluation for staff review. This was identified as Open Item 4.7.3-1(a).

In response to RAI 4.7.3-1(a), dated February 8, 2005, the applicant provided CEN-412, Revision 2, Supplement 2. The staff reviewed the report and found the evaluation used a non-conservative fracture toughness value of 150.4 ksi $\sqrt{in}$. Using the methodology in the report, along with the staff established fracture toughness value of 82 ksi $\sqrt{in}$, based on the staff's letter to NEI, dated May 19, 2000, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components," the staff determined that the time required to reach the limiting end-point crack size is 87 years, instead of 103 years. Since this bounds the extended period of operation, the staff finds that the Millstone, Unit 2 reactor coolant pump casing to have adequate toughness for the extended period of operation based on CEN-412, Revision 2, Supplement 2 and the staff's letter dated May 19, 2000. The applicant also submitted an additional supplemental response in a letter dated June 2, 2005, to clarify how it intends to manage the aging of its RCP casings through the period of extended operation. In the June 2, 2005, letter, the applicant stated that the RCP casings will be managed through inspections performed under the aging management program, "Inservice Inspection Program: Systems, Components and Supports," in accordance with 10 CFR 54.21(c)(1)(iii). The staff finds the applicant's management of thermal aging embrittlement using the ASME Code Case N-481 inspection requirements, which consist of a visual inspection, acceptable. This resolves Open Item 4.7.3-1(a).

ASME Code Case N–481 requires an inspection and a fracture mechanics evaluation. The LRA states that the RCP casing will be managed by the inservice inspection program for the period of extended operation consistent with 10 CFR 54.21(c)(1)(iii). In RAI 4.7.3-1(b) the applicant was requested to determine which option of 10 CFR 54.21(c)(1), (Options (i) or (ii)), applies for the fracture mechanics evaluation required by the code case, in addition to Option (iii) for the management by inspection.

In response to RAI 4.7.3-1(b), in a letter dated December 3, 2004, the applicant confirmed that the acceptable reactor coolant pump casing flaw sizes have been projected through the period of extended operation, consistent with 10 CFR 54.21(c)(1)(ii). This is acceptable to the staff since the RCP casing will be managed by the inservice inspection program and justified the use of a postulated flaw evaluation in lieu of the volumetric examinations of the cast austenitic RCP casings welds. This resolves RAI 4.7.3-1(b).

4.7A.3.3 FSAR Supplement

LRA Section A3.6.3 for Millstone Unit 2 provides a FSAR supplement summary description for the TLAA on the use of ASME Code Case N–481. In RAI 4.7.3-1(c), the staff requested the applicant to confirm that Section A3.6.3 of the LRA applies to the pump casing welds, not the pump casing as a whole, to be consistent with the code case. In response to RAI 4.7.3-1(c), in a letter dated December 3, 2004, the applicant confirmed that the use of ASME Code Case N–481 applies to the RCP casing welds and that the requirements of Table IWB-2500-1, Examination Category B-L-2, Item B12.20 of the ASME Code, Section XI apply. This resolves RAI 4.7.3-1(c).

On the basis of the staff's evaluation, the summary description for the reactor coolant system TLAA for the use of ASME Code Case N–481 described in the FSAR supplement (LRA, Appendix A) provides an adequate description of this TLAA, as required by 10 CFR 54.21(d).

4.7A.3.4 Conclusion

On the basis of its review, the staff concludes that the applicant has demonstrated, pursuant to 10 CFR 54.21(c)(1)(ii) and 10 CFR 54.21(c)(1)(iii), that for the TLAA on the use of ASME Code Case N–481 on the CASS RCP pump casing welds, the analysis remains valid through the period of extended operation for Millstone Unit 2. The staff also concludes that the Millstone Unit 2 FSAR supplement contains an adequate summary description of the TLAA on the use of ASME Code Case N–481 for the period of extended operation, as required by 10 CFR 54.21(d). The staff also concludes that the use of ASME Code Case N–481 is not a TLAA for Millstone Unit 3 since there are no welds in the pump casings. Therefore, the staff has reasonable assurance that the safety margins established and maintained during the current operating term for the cast austenitic RCP casings will be maintained through the period of extended operation for the Millstone units.

4.7A.4 Leak-Before-Break

4.7A.4.1 Summary of Technical Information in the Application

The applicant stated that a leak-before-break (LBB) analysis has been performed for the Millstone 2 reactor coolant system (RCS) primary loop. The analyses considered the thermal aging of cast austenitic stainless steel piping and the fatigue transients that drive the flaw growth over the operating life of the plant.

The fundamental premise of LBB is that the materials used in nuclear power plant piping are sufficiently tough that even a large through-wall crack would remain stable and not result in a double-ended pipe rupture.

The NRC modified 10 CFR Part 50 General Design Criterion (GDC) 4, “Environmental and Missile Design Bases,” in 1987. This change allows applicants to eliminate the dynamic effects of postulated ruptures in primary coolant loop piping in the design of PWRs if LBB criteria are met. In 1990, an LBB analysis was performed for CE-designed nuclear steam supply systems and documented in topical report CEN-367. This analysis demonstrated that plant monitoring systems can detect potential leaks in the RCS primary loop piping before a postulated crack causing the leak would grow to unstable proportions during the 40-year plant life. The NRC approved this analysis in its safety evaluation (SE) dated October 30, 1990. The original design basis for the Millstone Unit 2 RCS considered postulated breaks for the purposes of evaluating protection from the dynamic and environmental effects of the main coolant line (MCL) breaks.

The changes to GDC 4 allowed the application of LBB criteria for the selection of MCL breaks. The NRC approved the criteria for use at Millstone Unit 2 through its SE dated September 1, 1992. This application of LBB has eliminated the requirement to consider postulated breaks on the MCL in evaluating the dynamic effects on the RCS. The applicant’s original LBB analysis was updated by letter dated June 25, 1998 due to the replacement of the steam generators. The re-analysis was needed to demonstrate that the conclusions of the original analysis remain valid or have been effectively addressed by the revised evaluations. The staff reviewed and approved the updated analysis in a letter dated November 11, 1998.

4.7A.4.2 Staff Evaluation

The applicant describes its LBB analysis in Section 4.7.4 of the LRA for RCS piping. The staff reviewed this section to determine whether the applicant provided adequate information to meet the requirements contained in 10 CFR 54.21(c) related to the TLAA for LBB for Millstone Unit 2.

The staff confirmed that the NRC generically approved the LBB applications for the primary loop piping for Combustion Engineering Owners Group (CEOG) plants on October 30, 1990, and specifically for Millstone 2 on November 9, 1998. The CEOG provides this generic LBB evaluation in CEN-367-A. There are two time-limited considerations for LBB analysis, crack growth and thermal aging. The material properties of cast austenitic stainless steel (CASS) can change over time. Thermal aging causes an elevation in the yield strength of the material and a degradation of the fracture toughness, with the degree of degradation being a function of the level of ferrite in the material. Thermal aging in CASS will continue until a saturated or fully aged point is reached.

The assessment in CEN-367-A uses the fracture toughness values of the SA-515 Grade 70 carbon steel weld in the LBB analysis, which are the lowest among all base and weld materials in the primary loop piping system. The staff has compared the fracture toughness values in CEN-367-A with the more recent information in NUREG-6177, “Assessment of Thermal Embrittlement of Cast Stainless Steels,” and found that the fracture toughness data in CEN-367-A are more conservative than the NUREG-6177 lower-bound fracture toughness curve. Therefore, because the original analysis supporting LBB bounds fully aged CASS, the analysis does not have a material property time dependency that requires further evaluation for license renewal.

In response to RAI 4.7.4-1, the applicant stated that the LBB fatigue-crack growth analysis reported in CEN-367-A is based on 40-year design limits for RCS fatigue transient cycles. In CEN-367-A, the applicant performed a fatigue-crack growth analysis to show that fatigue will not cause degradation of the pressure boundary integrity. In the fatigue-crack growth analysis, the normal and upset cyclical loadings cause postulated flaws to grow. These cyclical loadings are based on reactor coolant design transient cycles. As described in Section 4.3.1 of the LRA, the number of transient cycles assumed in the original design for 40 years was found acceptable for 60 years of operation. Therefore, the postulated flaw growth in CEN-367-A (based on the RCS original design transient cycles) is unchanged for 60 years of operation. The staff finds the response acceptable and considers this issue closed.

In addition, the applicant has the “Metal Fatigue of the Reactor Coolant Pressure Boundary Program” to ensure that the accumulation of the applicable fatigue transient cycles over time will not invalidate the fatigue flaw growth analysis that it performed as part of the approved Millstone Unit 2 LBB analyses. With this program in place, which calls for constant review of the accumulation of applicable fatigue transient cycles, the applicant concluded that the continued implementation of the “Metal Fatigue of the Reactor Coolant Pressure Boundary Program” will provide reasonable assurance that the RCS components within the scope of license renewal will continue to perform their intended function(s) consistent with the CLB for the period of extended operation. The staff reviewed the “Metal Fatigue of Reactor Coolant Pressure Boundary Program” and determined that the program is adequate to monitor the applicable set of transients and their limits, and to count the actual thermal cycle transients to ensure that it is within the allowable limits of the defined transients. In the event that design cycle limits are approached, the applicant will review the analysis and determine appropriate actions.

Based on the above evaluation, the staff finds that the continued implementation of the “Metal Fatigue of the Reactor Coolant Pressure Boundary Program” provides reasonable assurance that thermal fatigue for the primary loop piping and components will be adequately managed, and therefore the analyses for this TLAA remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(ii).

The applicant reviewed and found the number and characteristics of cycles identified in CEN-367-A to be acceptable for the period of extended operation for the RCS piping at Millstone Unit 2. The applicant needed to identify all other systems or sections of piping that are covered by LBB analyses and if the analyses are applicable for the period of extended operation. The applicant needed to provide documented justification that the LBB analyses for systems covered by LBB analyses remain valid for the period of extended operation. The applicant needed to also provide justification that the analyses have been projected to the end of the period of extended operation, or that the effects of aging on the intended functions of the systems covered by LBB analyses will be adequately managed for the period of extended operation. The applicant needed to also update the FSAR supplement as appropriate. This was identified as Open Item 4.7.4-1.

By letter dated February 8, 2005, the applicant provided additional information to address Open Item 4.7.4-1. For Millstone Unit 2, the systems and components that have been analyzed for LBB include the reactor coolant loop piping (hot leg, cold leg, and crossover piping), the pressurizer surge line, and portions of the safety injection and shutdown cooling systems. The applicant stated that each of the LBB analyses associated with these systems and components were evaluated for the period of extended operation. The discussion for the reactor coolant loop piping is intended to envelope all of the current design basis LBB analyses. The materials evaluated for the subject components include carbon and low alloy steels, stainless steel (including cast austenitic stainless steel (CASS)) and nickel-based alloys. For each LBB analysis, the inputs to the evaluation were reviewed to identify time-limited assumptions. Thermal aging of CASS materials and fatigue crack growth calculations were determined to be time-based inputs as defined in 10 CFR 54.3 and required evaluation for the period of extended operation. The TLAA evaluations of metal fatigue are discussed in LRA Section 4.3.1 and the staff's evaluation is provided in Section 4.3 of this report. The metal fatigue TLAA evaluations conclude that design basis limits are not exceeded for ASME Class 1 components (which envelopes the components evaluated for LBB) through the period of extended operation. Thermal aging of CASS materials for components that have been evaluated for LBB has been evaluated for its effect on fracture toughness. The applicant's review concluded that the analysis used fully aged values for fracture toughness. Corrosion of nickel-based alloys was also considered. Cracking due to PWSCC of nickel-based alloys is managed by the Inservice Inspection Program: Systems, Components, and Supports AMP described in LRA Section B2.1.18. Millstone Unit 2 has committed to follow the industry recommendations related to nickel-based alloys. This commitment is identified in Appendix A, Table A6.0-1, License Renewal commitments, Item 14. The staff finds that the applicant has provided an adequate demonstration that the TLAA for LBB evaluations for the subject components remain valid or have been projected to the end of the period of extended operation. Therefore, the staff concludes that Open Item 4.7.4.1 is closed.

Since the V.C. Summer Nuclear Station main coolant loop weld cracking event involving Alloy 82/182 weld material, the staff has considered the effect of primary water stress-corrosion cracking on Alloy 82/182 piping welds as an operating plant issue affecting all piping with or without approved LBB applications. To resolve this issue, the industry has taken the initiative to (1) develop overall inspection and evaluation guidance, (2) assess the current inspection technology, and (3) assess the current repair and mitigation technology. An interim industry report, "PWR Materials Reliability Project Interim Alloy 600 Safety Assessment for US PWR Plants (MRP-44), Part 1: Alloy 82/182 Pipe Butt Welds," was published in April 2001 to justify the continued operation of PWRs while the industry completes the development of the final report. The staff accepted this interim report in an SE dated June 14, 2001, stating that, "Should the industry not be timely in resolving inspection capabilities to identify PWSCC in Alloy 600 welds, regulatory action may result."

4.7A.4.3 FSAR Supplement

Section A3.6.4 of Appendix A to the LRA provides the applicant's FSAR supplement regarding LBB for RCS piping. The plant design cycles in the applicant's LBB analysis are consistent with those used in the fatigue-crack growth analysis, and they bound the period of extended operation. In addition, the applicant's appropriate consideration of thermal aging of the CASS material constitutes the basis for the staff's acceptance of the applicant's evaluation of the LBB TLAA for the period of extended operation. On the basis of its review of the FSAR supplements, the staff concludes that the summary description of the applicant's TLAA evaluation to address LBB for the period of extended operation is adequate and satisfies 10 CFR 54.21(d).

4.7A.4.4 Conclusion

The staff concludes that, pursuant to 10 CFR 54.21(c)(1)(ii), the applicant has provided an acceptable demonstration that, for the TLAA on LBB of the RCS main-loop piping, the analysis will remain valid for the period of extended operation, and the applicant can adequately manage the effects of aging on the pressure boundary function for the period of extended operation. The staff also concludes that the FSAR supplements contain an adequate summary description of the evaluation of the TLAA for LBB, as required by 10 CFR 54.21(d). The applicant reviewed and found the number and characteristics of cycles identified in CEN-367-A to be acceptable for the period of extended operation for the RCS piping at Millstone Unit 2.

4.7B Unit 3 Other Plant-Specific Time-Limited Aging Analyses

4.7B.1 Crane Load Cycle Limit

4.7B.1.1 Summary of Technical Information in the Application

In LRA Section 4.7.1, the applicant identified the following examples of the types of cranes determined to be within the scope of license renewal. These cranes were designed in accordance with the guidance contained in NUREG-0612 “Control of Heavy Loads in Nuclear Power Plants.”

- containment polar crane
- spent fuel crane
- monorails
- jib cranes

NUREG-0612 requires that the design of heavy-load, overhead handling systems meets the intent of CMAA-70. Overhead cranes designed to CMAA-70 have an implicit fatigue design basis, equivalent to a limiting number of 100,000 load cycles.

The most frequently used crane is the spent fuel crane. The spent fuel crane is expected to experience approximately 15,500 load cycles over a 60-year period for the movement of spent fuel from the reactor to the spent fuel pool. In addition, the crane is used in support of other activities including fuel shuffles, and inspections. In supporting these uses, the spent fuel crane is expected to conservatively experience a total of 31,000 load cycles over a 60-year period. This number is well below the 100,000 load cycles allowed in CMAA-70.

4.7B.1.2 Staff Evaluation

The most frequently used crane is the spent fuel crane. This crane is projected to lift 31,000 load cycles over a 60-year period for Unit 3. In RAI 4.7.1-1 the staff requested the applicant to provide the basis for arriving at this projected figure of 31,000 cycles.

In its supplemental response dated January 11, 2005, the applicant stated:

> “The Millstone Unit 3 spent fuel pool crane is the most frequently used crane of those cranes within the scope of license renewal. As such, the spent fuel pool crane would

experience the highest number of load cycles over the period of extended operation. The capacity of the Unit 3 spent fuel pool crane is 6,000 pounds. A fuel assembly with its associated rigging weighs approximately 2,000 pounds.

Assuming full-core off-loads and subsequent reloading of the 193 fuel assemblies every 1.5 years, the spent fuel pool crane will experience 15,440 lifts (or load cycles) over a 60-year period.

193 X 2 lifts/cycle X 1 cycle/1.5 years X 60 years = 15,440 lifts

The spent fuel pool crane is also used to support other activities including fuel shuffles and inspections. Considering all of these uses, the spent fuel pool crane is expected to conservatively experience a total of 31,000 lifts (i.e., 15,440 lifts X 2) over a 60-year period. This number is well below the allowable number of 100,000."

The staff finds the applicant's response reasonable and acceptable because the applicant has provided a satisfactory basis for determining the projected number of lifts.

Considering all the uses, the spent fuel crane is likely to experience a total of 31,000 load cycles over a 60-year period. This number is well below the design load cycles of 100,000, and therefore acceptable. A similar conclusion based on projected load cycles being well below the number of design load cycles is applicable for the other cranes within the scope of license renewal.

4.7B.1.3 FSAR Supplement

In Appendix A, Section A3.5.1 of the application, the applicant provided a summary description of the evaluation of the crane load cycle limit. The applicant stated that the load cycles for these cranes were evaluated for the period of extended operation. For each crane, the projected load cycles through the period of extended operation will be less than the design load cycles and, therefore, all cranes in the scope of license renewal will continue to perform their intended function throughout the period of extended operation. On the basis of staff's review, the staff concludes that the applicant's description is sufficient to satisfy the requirements of 54.21(d).

4.7B.1.4 Conclusion

The staff has reviewed the information in Section 4.7.1 and Appendix A, Section A3.5.1 of the LRA, as well as the additional information discussed by the applicant in its response to staff's request for additional information. On the basis of the review discussed above, the staff concludes that the applicant has provided adequate information to meet the requirements of 10 CFR 54.21(c)(1), option (ii) related to the TLAA for the crane load cycle limits.

4.7B.2 Reactor Coolant Pump Flywheel

4.7B.2.1 Summary of Technical Information in the Application

In Section 4.7.2 of the Millstone Unit 3 LRA, the applicant addresses its analysis of fatigue-crack initiation and growth for the reactor coolant pump (RCP) flywheel.

The RCP motors are provided with flywheels to increase rotational inertia, thus prolonging pump coast-down and assuring a more gradual loss of primary coolant flow to the core in the event that pump power is lost. During normal operation, the RCP flywheels develop sufficient kinetic energy to produce high-energy missiles in the event of failure. Conditions that may result in overspeed of the pump increase both the potential for failure and the kinetic energy of the flywheel. These concerns led the NRC to issue RG 1.14, "Reactor Coolant Flywheel Integrity," Revision 1, August 1975. One of the recommendations of RG 1.14 is to volumetrically inspect the flywheels at 3- and 10-year intervals.

An evaluation was performed of the likelihood of flywheel failure over a 60-year period of operation and a justification was developed for the relaxation of RG 1.14, Revision 1, Regulatory Position C.4.b(2). The NRC has reviewed and accepted the topical report WCAP-14535-A, subject to certain conditions, for referencing in license applications. Using this evaluation, the NRC issued Amendment Number 169 for the Millstone Unit 3 RCP flywheel inspection frequency. The amendment allows Millstone Unit 3 to examine each of the RCP flywheels at least once every 10 years, coinciding with the ASME Section XI inservice inspection program.

The applicant concluded that the evaluation of the RCP flywheels represents a TLAA per 10 CFR 54.3 since it involves the use of time limited assumptions such as thermal cycles and crack growth rates. Consistent with 10 CFR 54.21(c)(1)(iii), the applicant concluded that the RCP flywheel fatigue will be adequately managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.

4.7B.2.2 Staff Evaluation

In Section 4.7.2 of the Millstone Unit 3 LRA, the applicant describes an analysis of fatigue-crack initiation and growth for the RCP flywheel. The staff reviewed this section to determine whether the applicant provided adequate information to meet the requirements of 10 CFR 54.21(c)(1), as the information relates to the TLAA for the RCP flywheel.

To reduce the RCP flywheel inspection frequency, Millstone Unit 3 submitted an amendment to its TS in a letter dated February 10, 1999. The amendment justification referenced the Westinghouse Topical Report WCAP-14535-A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," which was approved by the NRC with certain conditions. The conditions are specified in the NRC's SER dated September 12, 1996. The crack growth calculations were based on an assumed 6,000 cycles of RCP startups and shutdowns for a 60-year plant life. The LRA states that the number of cycles from actual plant operating conditions through the end of the period of extended operation is expected to be much less that the assumed 6,000 cycles.

In the applicant's response to RAI 4.7.2, dated December 3, 2004, the applicant stated that the RCP is expected to experience a total of 272 startup/shutdown cycles including the period of extended operation. The 6,000 cycles are considered to represent a conservative number of RCP startups/shutdowns for a 60-year period of operation. Assuming the presence of a large initial crack, additional crack growth after 6,000 startup/shutdown cycles of 0.08 inches is considered small.

The applicant's fatigue-crack growth analysis for the RCP flywheels demonstrates that the postulated flaw in the analysis is not expected to grow in excess of the critical crack size, even when the flywheels have been subjected to the change in the stress-intensity factor for the flywheels associated with 6,000 RCP startup/shutdown cycles. Since this bounds the number of RCP startups/shutdown cycles assumed for both the current operating period and the proposed period of extended operation, the staff concludes that the fatigue-crack growth analysis for the RCP flywheels meets the acceptance criterion for TLAAs in 10 CFR 54.21(c)(1)(ii), in that the analysis remains bounding for the period of extended operation.

4.7B.2.3 FSAR Supplement

Section A3.5.2 of Appendix A to the LRA provides the applicant's FSAR supplement regarding RCP flywheel provides a summary description consistent with the staff's evaluation discussed in Section 4.7.2.2 of this SER. The FSAR supplement summary description for the TLAA on the RCP flywheel is therefore acceptable to the staff, and satisfies the criterion for FSAR supplement summary descriptions in 10 CFR 54.21(d).

4.7B.2.4 Conclusion

The staff concludes that the applicant has provided an acceptable demonstration pursuant to 10 CFR 54.21(c)(1)(ii) that, for the TLAA on the RCP flywheel, the analysis remains valid for the period of extended operation and consistent with 10 CFR 54.21(c)(1)(iii), RCP flywheel fatigue cracking can be adequately managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.

The staff also concludes that the FSAR supplement contains an adequate summary description of this TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7B.3 Leak-Before-Break

4.7B.3.1 Summary of Technical Information in the Application

The applicant stated that a LBB analysis has been performed for Millstone Unit 3 RCS primary loop. The analyses for Millstone Unit 3 is documented within topical report WCAP-10587, June 1984.

The fundamental premise of LBB is that the materials used in nuclear power plant piping are sufficiently tough that even a large through-wall crack would remain stable and not result in a double-ended pipe rupture.

The NRC modified 10 CFR Part 50 General Design Criterion (GDC) 4, "Environmental and Missile Design Bases," in 1987. This change allows applicants to exclude the dynamic effects of postulated ruptures in primary coolant loop piping in the design of PWRs if LBB criteria are met. The methodology and criteria developed by the NRC for preparing LBB analyses are described in NUREG-1061, Volume 3, and summarized within the Draft Standard Review Plan, Section 3.6.3, Leak-Before-Break Evaluation Procedures.

The applicant stated that consistent with 10 CFR 54.21(c)(1)(ii), acceptable LBB evaluations have been projected to the end of the period of extended operation.

4.7B.3.2 Staff Evaluation

The applicant completed an evaluation of the RCS primary loop piping LBB analyses. The evaluation is documented in WCAP-10587, "Technical Bases for Eliminating Large Primary Loop Pipe Ruptures as the Structural Design Basis for Millstone Unit 3."

WCAP-10587 provides a plant-specific LBB analysis for RCS piping at Millstone Unit 3 based on a 40-year life of the nuclear power plant. The applicant stated that WCAP-10587 was reviewed and found acceptable for the period of extended operation. The staff review of WCAP-10587 found that additional information was needed to come to this conclusion. The applicant stated that "Millstone Unit 3 loads, material properties, transients and primary system geometry are enveloped by the parameters identified in WCAP-9558 and WCAP-10456." The staff review of these documents confirmed that they are based on a 40-year life of a nuclear power plant.

As such, the applicant needed to provide its LBB evaluations projected to the end of the period of extended operation. In accordance with GDC 4 and 10 CFR 54.21(c)(1)(ii), the applicant must demonstrate that the analyses have been projected to the end of the period of extended operation. In addition, if other piping, other than the RCS primary loop piping, was covered by LBB analyses, the applicant needed to address the analyses in accordance with 10 CFR 54.21(c)(1). This was identified as Open Item 4.7.4-1. These analyses needed to be reviewed and approved by the staff pursuant to the acceptance criteria in Section 4.7.3.1.2 of NUREG-1800, which states that the documented results of the revised analyses are to be reviewed to verify that their period of evaluation is extended such that they are valid for the period of extended operation. The analyses needed to include the thermal aging on the material properties of cast austenitic stainless steel and the effects on the fatigue crack growth analysis. The methodology and criteria developed by the NRC for preparing LBB analyses are described in NUREG-1061, Volume 3, and NUREG-0800, Standard Review Plan, Section 3.6.3, Leak-Before-Break Evaluation Procedures which were established after the applicant's topical report WCAP-10587.

By letter dated February 8, 2005, the applicant provided additional information to address Open Item 4.7.4-1. The applicant stated that for Millstone Unit 3, the reactor coolant system loop piping (hot leg, cold leg and crossover piping) has been evaluated for LBB. The materials evaluated for these components include carbon and low alloy steels, stainless steel (including CASS), and nickel-based alloys.

CASS used in the RCS are subject to thermal aging during service. Thermal aging causes an elevation in the yield strength of the material and a decrease in the fracture toughness. The decrease in fracture toughness is proportional to the level of ferrite in the material. Thermal aging in these stainless steels will continue until a saturation or fully aged point is reached. The applicant needed to address how fatigue will be evaluated or monitored to assure that the number of cycle counts for a transient set do not exceed its cycle limits which could invalidate the fatigue crack growth analysis. By letter dated February 8, 2005, the applicant provided information to address the LBB analyses for Millstone Unit 3. The applicant stated that each of the LBB analyses associated with these systems and components were evaluated for the period of extended operation. The discussion for the reactor coolant loop piping is intended to envelope all of the current design basis LBB analyses. The materials evaluated for the subject components include carbon and low alloy steels, stainless steel (including cast austenitic stainless steel (CASS)) and nickel-based alloys. For each LBB analysis, the inputs to the evaluation were reviewed to identify time-limited assumptions. Thermal aging of CASS materials and fatigue crack growth calculations were determined to be time-based inputs as defined in 10 CFR 54.3 and required evaluation for the period of extended operation. The TLAA evaluations of metal fatigue are discussed in LRA Section 4.3.1 and the staff's evaluation is provided in Section 4.3 of this report. The metal fatigue TLAA evaluations conclude that design basis limits are not exceeded for ASME Class 1 components (which envelopes the components evaluated for LBB) through the period of extended operation. Thermal aging of CASS materials for components that have been evaluated for LBB has been evaluated for its effect on fracture toughness. The applicant's review concluded that the analysis used fully aged values for fracture toughness. Corrosion of nickel-based alloys was also considered. Cracking due to PWSCC of nickel-based alloys is managed by the Inservice Inspection Program: Systems, Components, and Supports AMP described in LRA Section B2.1.18. Millstone Unit 3 has committed to follow the industry recommendations related to nickel-based alloys. This commitment is identified in Appendix A, Table A6.0-1, License Renewal commitments, Item 15. The staff finds that the applicant has provided an adequate demonstration that the TLAA for LBB evaluations for the subject components remain valid or have been projected to the end of the period of extended operation. Therefore, the staff concludes that Open Item 4.7.4.1 is closed.

4.7B.3.3 FSAR Supplement

Section A3.5.3 of Appendix A to the LRA provides the applicant's FSAR supplement regarding LBB for RCS piping. The FSAR supplement states, "The acceptability of eliminating Reactor Coolant System pipe LBB considerations for Millstone Unit 3 is contained within Westinghouse Topical Report WCAP-10587. The report has been re-evaluated and to be applicable for the period of extended operation." This paragraph was not clear on how the report was re-evaluated and why it is acceptable for the period of extended operation. In addition, the statement was not clear on what considerations are acceptable to be eliminated. The applicant needed to include in the summary how the report was re-evaluated and why it is applicable for the period of extended operation. The applicant also needed to address how thermal aging of CASS is supported in WCAP-10587 for the period of extended operation and how the fatigue-crack growth analysis is acceptable for the period of extended operation. On the basis of its review of the FSAR supplements, the staff concluded that the summary description of the applicant's TLAA evaluation to address LBB for the RCS piping for the period of extended operation required additional clarification to satisfy 10 CFR 54.21(d). This was identified as Confirmatory Item 4.7.4-1.

By letter dated April 1, 2005, the applicant provided the requested update to Section A3.5.3 of Appendix A to provide a summary description of the evaluation of the TLAA for LBB. The staff reviewed the revised summary description and finds that the revised summary description of the applicant's TLAA evaluation to address LBB for the period of extended operation is now adequate and satisfies 10 CFR 54.21(d). Based on the above, Confirmatory Item 4.7.4-1 is closed.

4.7B.3.4 Conclusion

The staff concludes that, pursuant to 10 CFR 54.21(c)(1), the applicant has provided an acceptable demonstration that, for the TLAA on LBB, will remain valid for the period of extended operation, and that the applicant will adequately manage the effects of aging on the pressure boundary function for the period of extended operation. The staff also concludes that the FSAR supplement contains an adequate summary description of the evaluation of the TLAA for LBB, as required by 10 CFR 54.21(d).

4.8 Conclusion for Time-Limited Aging Analyses

The staff has reviewed the information in LRA Section 4, "Time-Limited Aging Analysis." On the basis of its review, the staff concludes that the applicant has provided an adequate list of TLAAs, as defined in 10 CFR 54.3. Further, the staff concludes that the applicant has demonstrated that (1) the TLAAs will remain valid for the period of extended operation, as required by 10 CFR 54.21(c)(1)(i), (2) the TLAAs have been projected to the end of the period of extended operation, as required by 10 CFR 54.21(c)(1)(ii), or (3) that the aging effects will be adequately managed for the period of extended operation, as required by 10 CFR 54.21(c)(1)(iii). The staff has also reviewed the FSAR supplement for the TLAAs and finds that the FSAR supplement contains descriptions of the TLAAs sufficient to satisfy the requirements of 10 CFR 54.21(d). In addition, the staff concludes that no plant-specific exemptions are in effect that are based on TLAAs, as required by 10 CFR 54.21(c)(2).

With regard to these matters, the NRC staff has concluded that there is reasonable assurance that the activities authorized by the renewed licenses will continue to be conducted in accordance with the current licensing basis, and that any changes made to the MPS current licensing basis in order to comply with 10 CFR 54.29(a) are in accord with the Act and the Commission's regulations.

5. REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

In accordance with Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), the Advisory Committee on Reactor Safeguards (ACRS) will review the license renewal applications (LRAs) for the Millstone Power Station, Units 2 and 3. The ACRS Subcommittee on Plant License Renewal will continue its detailed review of the LRA after this safety evaluation report (SER) is issued. The applicant and staff from the U.S. Nuclear Regulatory Commission (the staff) will meet with the subcommittee and the full committee to discuss issues associated with the review of the LRAs.

After the ACRS completes its review of the LRAs and the SER, the full committee will issue a report discussing the results of its review. An update to this SER will include the ACRS report. This update will also include the staff's response to any issues and concerns identified in the ACRS report.

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6. CONCLUSIONS

The staff of the U.S. Nuclear Regulatory Commission (NRC or the Commission) reviewed the license renewal applications for the Millstone Power Station, Units 2 and 3, in accordance with Commission regulations and NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” dated July 2001. Title 10, Section 54.29, of the *Code of Federal Regulations* (10 CFR 54.29) provides the standards for issuance of a renewed license.

On the basis of its evaluation of the license renewal applications, the NRC staff concludes that the requirements of 10 CFR 54.29(a) have been met and all open items and confirmatory items of the safety evaluation report have been resolved.

The staff notes that any requirements of Subpart A of 10 CFR Part 51 are documented in Supplement 22 to NUREG-1437 “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Millstone Power Station, Units 2 and 3 Final Report,” dated July 18, 2005.

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APPENDIX A: COMMITMENTS FOR LICENSE RENEWALS OF MPS Units 2 and 3

During the review of the Millstone Power Station, Units 2 and 3, LRAs by the NRC staff, the applicant made commitments related to aging management programs (AMPs) to manage aging effects of structures and components (SCs) prior to the periods of extended operation. The following tables list these commitments, along with the implementation schedules and the sources of the commitment.

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APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
1	The existing inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already included in the program.	A2.1.1, Battery Rack Inspection	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.1
2	Implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks.	A2.1.1, Battery Rack Inspection	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.1
3	A baseline inspection of the in-scope buried piping located in a damp soil environment will be performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.	A2.1.4, Buried Pipe Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.4 July 7, 2004, LRA Supplement Attachment 1, Page 12

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
4	The maintenance and work control procedures will be revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.	A2.1.4, Buried Pipe Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.4 July 7, 2004, LRA Supplement Attachment 1, Page 12
5	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be established.	A2.1.8, Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.8
6	Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. The program (if needed for fuse holders) will consider the aging stressors for the metallic clips.	A2.1.8, Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Completed	LRA Appendix B, Section B2.1.8 February 15, 2005 Letter Attachment, Page 4

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
7	Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low level signals and where the instrumentation is not calibrated in situ.	A2.1.9, Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	LRA Appendix B, Section B2.1.9
8	A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components, whose internal surfaces are exposed to raw water, to confirm there is no degradation.	A2.1.10, Fire Protection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.10
9	Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program.	A2.1.10, Fire Protection Program	Prior to the Sprinkler Heads Achieving 50 Years of Service Life Not to Exceed a 10 Year Frequency Thereafter	LRA Appendix B, Section B2.1.10 July 7, 2004, LRA Supplement Attachment 1, Page 1

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
10	The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns will be enhanced to provide expectations that identify the requirements for the inspection of aging effects.	A2.1.13, General Condition Monitoring	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.13
11	In-scope cable found to be submerged will be subject to an engineering evaluation and corrective action. The evaluation of cables having significant voltage found to be submerged in standing water for an extended period of time will be based on appropriate testing (using available technology consistent with NRC positions) of cables that are determined to be wetted for a significant period of time. The Engineering evaluation will also address the appropriate testing requirements for the corresponding ten-year intervals during the period of extended operation. The test will use a proven methodology for detecting deterioration of the insulation system due to wetting. Examples of such tests include power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, Effects of Moisture on the Life of Power Plant Cables, or other appropriate testing. Testing will have acceptance criteria defined in accordance with the specific test identified. Occurrence of degradation that is adverse to quality is entered into the Corrective Action Program.	A2.1.14, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation During the Corresponding 10 Year Interval (If Applicable)	July 7, 2004 LRA Supplement Attachment 1, Page 17

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
12	The Infrequently Accessed Areas Inspection Program will be established.	A2.1.15, Infrequently Accessed Areas Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.15
13	Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), stress corrosion cracking (PWSCC and IASCC), and loss of pre-load for baffle and former-assembly bolts and will implement the appropriate recommendations resulting from this guidance. The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval.	A2.1.17, Inservice Inspection Program: Reactor Vessel Internals	At Least Two Years Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.17 July 7, 2004, LRA Supplement Attachment 1, Page 1 February 8, 2005 LRA Supplement Attachment 2, Page 30

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
14	Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. The revised program description will be submitted prior to the period of extended operation for staff review and approval to determine if the program demonstrates the ability to manage the effects of aging in nickel based components per 10 CFR 50.54.21(a)(3).	A2.1.18, Inservice Inspection Program: Systems, Components and Supports A2.1.22, Steam Generator Structural Integrity	At Least Two Years Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.18 April 1, 2005 Attachment 2, Page 8
15	The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program.	A2.1.19, Inspection Activities: Load Handling Cranes and Devices	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.19
16	Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal added in Commitment 15.	A2.1.19, Inspection Activities: Load Handling Cranes and Devices	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.19

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
17	The implementing procedure will be modified to include American Concrete Institute (ACI) Standard 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures," dated 1996, and American Nuclear Standards Institute/American Society of Civil Engineers (ANSI/ASCE) Standard 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," dated 1990, as references and input documents for the inspection program.	A2.1.23, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
18	The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures.	A2.1.23, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
19	Groundwater samples will be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.	A2.1.23, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
20	The Structures Monitoring Program and implementing procedures will be modified to alert the appropriate engineering organization if the structures inspections identify that medium-voltage cables in the scope of license renewal have been submerged.	A2.1.23, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
21	The maintenance and work control procedures will be revised to ensure that inspections of inaccessible areas are performed when the areas become accessible by such means as excavation or installation of shielding during maintenance or for any other reason.	A2.1.23, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
22	Appropriate inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks will be performed.	A2.1.24, Tank Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.24
23	Non-destructive volumetric examination of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, will be performed prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.	A2.1.24, Tank Inspection Program	Prior to Period of Extended Operation A Frequency Consistent with Scheduled Tank Internals Inspection Activities	LRA Appendix B, Section B2.1.24
24	The security diesel fuel oil tank and diesel fire pump fuel oil tank are in-scope for license renewal and will be included on the respective Tank Inspection Program inspection plan.	A2.1.24, Tank Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.24

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
25	Changes will be made to maintenance and work control procedures to ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities.	A2.1.25, Work Control Process	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.25
26	Dominion actively participates in a comprehensive industry initiative, in response to NRC Generic Issue 23 (GI-23), "Reactor Coolant Pump Seal Failure." Dominion is following the industry efforts on this issue and will implement the appropriate recommendations resulting from this guidance prior to the period of extended operation.	Environmental Report	Prior to Period of Extended Operation	Environmental Report - SAMA Analysis
27	For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3.	A2.1.18, Inservice Inspection Program: Systems, Components and Supports	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 5

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
28	Millstone will follow industry efforts that will provide specific guidance to license renewal applicants for evaluating the environmental effects of fatigue on applicable locations, other than those identified in NUREG/CR-6260. Millstone will also implement the appropriate recommendations resulting from this guidance.	A3.2.3 Environmentally Assisted Fatigue	Prior to the Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1
29	A baseline visual inspection will be performed of the accessible areas of the shell side (including accessible portions of the exterior side of the tubes) of one: • Millstone Unit 2 Reactor Building Closed Cooling Water heat exchanger, • Millstone Unit 2 Emergency Diesel Generator Jacket Cooling Water heat exchanger, and • Millstone Unit 3 Emergency Diesel Generator Jacket Cooling Water heat exchanger.	A2.1.7, Closed-Cycle Cooling Water System	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 6
30	Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods	A2.1.25, Work Control Process	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 14

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
31	A review of the Work Control Process inspection opportunities for each material and environment group, supplemental to the initial review conducted during the development of the LRA, will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the Work Control Process.	A2.1.25, Work Control Process	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 20
32	Calibration results for cable tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to entering the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.	A2.1.9, Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	December 3, 2004, LRA Supplement Attachment 3, Page 1
33	The in scope cables in Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTXXSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function	A2.1.14, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	December 3, 2004, LRA Supplement Attachment 3, Page 3

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
34	In addition to the testing specified in Commitment 33, a representative sample of in-scope medium-voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function.	A2.1.14, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	January 11, 2005, Attachment 3, Page 1
35	Complete the SAMA evaluation of the capability to flash the Diesel Generator field in the event of extended loss of DC power with a loss of offsite power. If this SAMA is cost beneficial (i.e., can be accomplished without a hardware modification), a Severe Accident Management Guideline (SAMG) addressing this mitigation strategy will be developed.	Environmental Report	Prior to Period of Extended Operation	August 13, 2004, RAI Responses, Page 2
36	Dominion will replace the Millstone Unit 2 pressurizer using materials that are resistant to PWSCC.	A2.1.18, Inservice Inspection Program: Systems, Components and Supports	Prior to Period of Extended Operation	February 8, 2005, Attachment 2, Page 33

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 2				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
37	Updated USE, RT_{PTS}, and P-T limits based on fluence values developed in accordance with Regulatory Guide 1.190 requirements, as amended or superseded by future regulatory guidance changes, will be submitted to the NRC for review.	A3.1 Reactor Vessel Neutron Embrittlement	At Least Two Years Prior to Period of Extended Operation	February 8, 2005, Attachment 2, Page 11

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
1	The existing inspection program will be modified to include those battery racks that require monitoring for license renewal, but are not already included in the program.	A2.1.1, Battery Rack Inspection	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.1
2	Implementing procedures will be modified to include loss of material as a potential aging effect and to provide guidance on the inspection of items (such as anchorages, bracing and supports, side and end rails, and spacers), which contribute to battery rack integrity or seismic design of the battery racks.	A2.1.1, Battery Rack Inspection	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.1
3	A baseline inspection of the in-scope buried piping located in a damp soil environment will be performed for a representative sample of each combination of material and protective measures. Inspection for the loss of material due to selective leaching will be performed by visual, and mechanical or other appropriate methods.	A2.1.3, Buried Pipe Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.4 July 7, 2004, LRA Supplement Attachment 1, Page 12

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
4	The maintenance and work control procedures will be revised to ensure that inspections of buried piping are performed when the piping is excavated during maintenance or for any other reason. These procedures will include the inspection for the loss of material due to selective leaching which will be performed by visual, and mechanical or other appropriate methods.	A2.1.3, Buried Pipe Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.4 July 7, 2004, LRA Supplement Attachment 1, Page 12
5	The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be established.	A2.1.7, Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.8
6	Fuse holders meeting the requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holder will either be replaced, modified to minimize the aging effects, or this program will manage the aging effects. The program (if needed for fuse holders) will consider the aging stressors for the metallic clips.	A2.1.7, Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Completed	LRA Appendix B, Section B2.1.8 February 15, 2005 Letter Attachment, Page 4

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
7	Procedures will be developed to employ an alternate testing methodology to confirm the condition of cables and connectors in circuits that have sensitive, low level signals and where the instrumentation is not calibrated in situ.	A2.1.8, Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency	LRA Appendix B, Section B2.1.9
8	A baseline visual inspection will be performed on a representative sample of the buried fire protection piping and components, whose internal surfaces are exposed to raw water, to confirm there is no degradation.	A2.1.9, Fire Protection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.10
9	Testing a representative sample of fire protection sprinkler heads or replacing those that have been in service for 50 years will be included in the Fire Protection Program.	A2.1.9, Fire Protection Program	Prior to the Sprinkler Heads Achieving 50 Years of Extended Life Not to Exceed a 10 Year Interval Thereafter	LRA Appendix B, Section B2.1.10 July 7, 2004, LRA Supplement Attachment 1, Page 1

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
10	The procedures and training for personnel performing General Condition Monitoring inspections and walkdowns will be enhanced to provide expectations that identify the requirements for the inspection of aging effects.	A2.1.12, General Condition Monitoring	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.13
11	In-scope cable found to be submerged will be subject to an engineering evaluation and corrective action. The evaluation of cables having significant voltage found to be submerged in standing water for an extended period of time will be based on appropriate testing (using available technology consistent with NRC positions) of cables that are determined to be wetted for a significant period of time. The Engineering evaluation will also address the appropriate testing requirements for the corresponding ten-year intervals during the period of extended operation. The test will use a proven methodology for detecting deterioration of the insulation system due to wetting. Examples of such tests include power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, Effects of Moisture on the Life of Power Plant Cables, or other appropriate testing. Testing will have acceptance criteria defined in accordance with the specific test identified. Occurrence of degradation that is adverse to quality is entered into the Corrective Action Program.	A2.1.13, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation During the Corresponding 10 Year Interval (If Applicable)	LRA Appendix B, Section B2.1.14 July 7, 2004, LRA Supplement Attachment 1, Page 17

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
12	The Infrequently Accessed Areas Inspection Program will be established.	A2.1.14, Infrequently Accessed Areas Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.15
13	Millstone will follow the industry efforts on reactor vessel internals regarding such issues as thermal or neutron irradiation embrittlement (loss of fracture toughness), void swelling (change in dimensions), stress corrosion cracking (PWSCC and IASCC), and loss of pre-load for baffle and former-assembly bolts and will implement the appropriate recommendations resulting from this guidance. The revised program description, including a comparison to the 10 program elements of the NUREG-1801 program, will be submitted to the NRC for approval.	A2.1.16, Inservice Inspection Program: Reactor Vessel Internals	At Least Two Years Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.17 July 7, 2004, LRA Supplement Attachment 1, Page 1 February 8, 2005 LRA Supplement Attachment 2, Page 30
14	Augmented inspections of the MPS Unit 3 core barrel holddown spring will be performed. In particular, the inspection will detect gross indication of loss of preload as an aging effect. As an alternative to performing an augmented inspection, the holddown spring will be replaced.	A2.1.16. Inservice Inspection Program: Reactor Vessel Internals	At Least Two Years Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.17

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
15	Millstone will follow the industry efforts investigating the aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identifying the appropriate aging management activities and will implement the appropriate recommendations resulting from this guidance. The revised program description will be submitted prior to the period of extended operation for the staff review and approval to determine if the program demonstrates the ability to manage the effects of aging in nickel based components per 10 CFR 50.54.21(a)(3).	A2.1.17, Inservice Inspection Program: Systems, Components and Supports A2.1.21, Steam Generator Structural Integrity	At Least Two Years Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.18 April 1, 2005, Attachment 2, Page 8
16	The existing inspection program will be modified to include those lifting devices that require monitoring for license renewal, but are not already included in the program.	A2.1.18, Inspection Activities: Load Handling Cranes and Devices	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.19
17	Implementing procedures and documentation will be modified to include visual inspections for the loss of material on the crane and trolley structural components and the rails in the scope of license renewal added in Commitment 16.	A2.1.18, Inspection Activities: Load Handling Cranes and Devices	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.19

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
18	The implementing procedures will be modified to include American Concrete Institute (ACI) Standard 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures," dated 1996, and American Nuclear Standards Institute/American Society of Civil Engineers (ANSI/ASCE) Standard 11-90, "Guideline for Structural Condition Assessment of Existing Buildings," dated 1990, as references and input documents for the inspection program.	A2.1.22, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
19	The Structures Monitoring Program and implementing procedures will be modified to include all in-scope structures.	A2.1.22, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
20	Groundwater samples will be taken on a periodic basis, considering seasonal variations, to ensure that the groundwater is not sufficiently aggressive to cause the below-grade concrete to degrade.	A2.1.22, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
21	The structures monitoring program and implementing procedures will be modified to alert the appropriate engineering organization if the structures inspections identify that medium-voltage cables in the scope of license renewal have been submerged.	A2.1.22, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
22	The maintenance and work control procedures will be revised to ensure that inspections of inaccessible areas are performed when the areas become accessible by such means as excavation or installation of shielding during maintenance or for any other reason.	A2.1.22, Structures Monitoring Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.23
23	Appropriate inspections of sealants and caulking used for moisture intrusion prevention in and around aboveground tanks will be performed.	A2.1.23, Tank Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.24
24	Non-destructive volumetric examination of the in-scope inaccessible locations, such as the external surfaces of tank bottoms, will be performed prior to the period of extended operation. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.	A2.1.23, Tank Inspection Program	Prior to Period of Extended Operation A Frequency Consistent with Scheduled Tank Internals Inspection Activities.	LRA Appendix B, Section B2.1.24
25	The security diesel fuel oil tank and diesel fire pump fuel oil tank are in-scope for license renewal and will be included on the respective Tank Inspection Program inspection plan.	A2.1.23, Tank Inspection Program	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.24

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
26	Changes will be made to maintenance and work control procedures to ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented for aging effects during maintenance activities.	A2.1.24, Work Control Process	Prior to Period of Extended Operation	LRA Appendix B, Section B2.1.25
27	Consistent with 10 CFR 54.21(c)(1), (iii), the effects of environmentally assisted fatigue for those specific locations with a CUF greater and 1.0 will be managed by the Metal Fatigue of Reactor Coolant Pressure Boundary program. If the specific locations are not repaired, replaced, or successfully re-analyzed, a modified inspection program description, including a comparison to the 10 program elements of NUREG-1801 program, will be submitted to the NRC for approval.		Prior to Period of Extended Operation	Environmental Assisted Fatigue TLAA
28	For potentially susceptible CASS materials, either enhanced volumetric examinations or a unit or component specific flaw tolerance evaluation (considering reduced fracture toughness and unit specific geometry and stress information) will be used to demonstrate that the thermally-embrittled material has adequate fracture toughness in accordance with NUREG-1801 Section XI.M12.3.	A3.2.3 Environmentally Assisted Fatigue	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 3 December 12, 2004, LRA Supplement, Attachment 1, Page 102

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
29	Millstone will follow industry efforts that will provide specific guidance to license renewal applicants for evaluating the environmental effects of fatigue on applicable locations, other than those identified in NUREG/CR-6260. Millstone will also implement the appropriate recommendations resulting from this guidance. Until these recommendations are available, Millstone 3 commits to using the pressurizer surge line nozzle as a leading indicator to address environmental effects of fatigue on pressurizer sub-components during the period of extended operation.	A3.2.3 Environmentally Assisted Fatigue	Prior to Period of Extended Operation	Environmental Assisted Fatigue TLAA July 7, 2004, LRA Supplement, Attachment 1, Page 3 December 3, 2004, LRA Supplement, Attachment 1, Page 102
30	A baseline visual inspection will be performed of the accessible areas of the shell side (including accessible portions of the exterior side of the tubes) of one: • Millstone Unit 2 Reactor Building Closed Cooling Water heat exchanger, • Millstone Unit 2 Emergency Diesel Generator Jacket Cooling Water heat exchanger, and • Millstone Unit 3 Emergency Diesel Generator Jacket Cooling Water heat exchanger.	A2.1.6, Closed-Cycle Cooling Water System	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 6

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
31	Using the Work Control Process, a baseline inspection for the loss of material due to selective leaching will be performed on a representative sample of locations for susceptible materials by visual, and mechanical or other appropriate methods	A2.1.24, Work Control Process	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 14
32	A review of the Work Control Process inspection opportunities for each material and environment group, supplemental to the initial review conducted during the development of the LRA, will be performed. Baseline inspections will be performed for the material and environment combinations that have not been inspected as part of the Work Control Process.	A2.1.24, Work Control Process	Prior to Period of Extended Operation	July 7, 2004, LRA Supplement Attachment 1, Page 20
33	Calibration results for cable tested in situ will be reviewed to detect severe aging degradation of the cable insulation. The initial review will be completed prior to entering the period of extended operation and will include at least 5 years of surveillance test data for each cable reviewed. Subsequent reviews will be performed on a period not to exceed 10 years.	A2.1.8, Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	December 3, 2004, LRA Supplement Attachment 3, Page 1

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
34	The in scope cables in Unit 3 duct lines # 929 (SBO Diesel to Unit 3 4.16kV Normal Switchgear) and # 973 (RSST 3RTXXSR-B to 6.9kV Normal Switchgear Bus 35A, 35B, 35C and 35D) will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function	A2.1.13, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	December 3, 2004, LRA Supplement Attachment 3, Page 3
35	In addition to the testing specified in Commitment 34, a representative sample of in-scope medium-voltage cables will be tested to demonstrate that water treeing will not prevent the cables from performing their intended function.	A2.1.13, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation Not to Exceed a 10 Year Frequency Thereafter	January 11, 2005, Attachment 3, Page 1
36	Complete the SAMA evaluation of the ability to manually control the Turbine Driving Auxiliary Feedwater Pump. If this SAMA is cost beneficial (i.e., can be accomplished without a hardware modification), a Severe Accident Management Guideline (SAMG) addressing this mitigation strategy will be developed.	Environmental Report	Prior to Period of Extended Operation	August 13, 2004, RAI Responses, Page 2

APPENDIX A: COMMITMENTS FOR LICENSE RENEWAL OF MPS UNIT 3				
Item No.	**Commitment**	**LRA Appendix A**	**Implementation Schedule**	**Source**
37	The pressurizer spray head assembly will be either replaced or inspected utilizing the best currently available (at the time of inspection) techniques for detecting cracking resulting from SCC.	A2.1.17, Inservice Inspection Program: Systems, Components and Supports	Prior to Period of Extended Operation	February 8, 2005, Attachment 2, Page 12

APPENDIX B: CHRONOLOGY

This appendix contains a chronological listing of the routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and the Millstone Power Station (MPS), and other correspondence regarding the NRC staff's reviews of the Millstone Power Station, Units 2 and 3 (MPS), (under Docket Number 50-336 and 50-423 respectively) license renewal application (LRA).

January 20, 2004	Millstone Unit 2, Application for Renewed Operating License, Technical and Administrative Information through Appendix D (Accession No. ML040260101)
January 20, 2004	Millstone Unit 3, Application for Renewed Operating License, Technical and Administrative Information through Appendix D (Accession No. ML040260103)
January 20, 2004	Applicant's Environmental Report - Operating License Renewal Stage, Millstone Power Station Units 2 and 3 (Accession No. ML040260098)
January 20, 2004	Letter from Dominion Nuclear Connecticut, Inc. (DNC) to the NRC regarding Applications for Renewed Operating Licenses (Accession No. ML040260070)
January 20, 2004	Letter from David A. Christian, Dominion Nuclear Connecticut, Inc., to the NRC transmitting Applications for Renewed Operating Licenses - Reference Drawings (Accession No. ML040260076)
January 20, 2004	Letter from Dominion to the NRC regarding Applications for Renewed Operating Licenses, Withheld Reference Drawings (Accession No. ML040260079)
January 23, 2004	Press Release-04-011 from NRC News: NRC Makes License Renewal Application Available for the Millstone Nuclear Power Plant (Accession No. ML040230280)
January 26, 2004	Memorandum from Russell Arrighi, NRC, to Samson S. Lee, NRC, regarding the notice of a meeting between the NRC staff and Dominion Nuclear Connecticut, Inc. to discuss the License Renewal Application for Millstone Nuclear Power Station Units 2 and 3 (Accession No. ML040260283)
January 28, 2004	Letter from Pao-Tsin Kuo, NRC to David A. Christian, Dominion Nuclear Connecticut, Inc. acknowledging the receipt and availability of the LRA for the Millstone Power Station, Units 2 and 3 (Accession No. ML040280258)

January 29, 2004	Memorandum from Johnny Eads, NRC to Samson S. Lee, NRC regarding a forthcoming meeting for the NRC to describe the license renewal process (Accession No. ML040330844)
February 5, 2004	Letter from Richard L. Emch, Jr., NRC, to Judy Liskov, Waterford public library regarding maintenence of referenced material for the Millstone Power Station Units 2 and 3 License Renewal Application (Accession No. ML040400209)
February 5, 2004	Letter from Richard L. Emch, Jr., NRC, to Mildred Hodge, Thames River Campus regarding maintenance of referenced material for Millstone Power Station Units 2 and 3 License Renewal Application (Accession No. ML040400181)
February 6, 2004	Press Release-I-04-002 from NRC News announcing NRC to hold a forthcoming public information meeting in Waterford, Connecticut (Accession No. ML040370209)
February 6, 2004	Millstone License Renewal Application (LRA) Submittal Presentation Handout and consistency with NUREG-1801 Handout (Accession No. ML040560327)
February 12, 2004	Certificate of Service of Petition to Intervene and Request for Hearing (Accession No. ML040760946)
February 12, 2004	Petition to Intervene and Request for Hearing (Accession No. ML041040332)
February 13, 2004	Letter from David R. Lewis, Shaw Pittman LLP, to Annette Vietti-Cook, Secretary for the Commission, NRC, indicating that the Petition to Intervene and Request for Hearing of The Coalition Against Millstone is Premature (Accession No. ML040760954)
February 20, 2004	Memorandum from Russell J. Arrighi, NRC, summarizing the meeting between the NRC and Dominion Nuclear Connecticut, Inc. to discuss Millstone Power Station Units 2 and 2 License Renewal Application (Accession No. ML040560319)
March 1, 2004	Letter from Nancy Burton, Attorney at Law, to the Office of the Secretary, NRC in response to the letter of David R. Lewis of February 13, 2004, (Accession No. ML040760958)
March 2, 2004	Letter from Paul B. Eccard, Town of Waterford, to Russell J. Arrighi, NRC, requesting that NRC consider the Town of Waterford a party to all preceedings for the re-licensing of Millstone Units 2 and 3 (Accession No. ML040700550)

March 3, 2004	Annual Assessment Letter - Millstone Power Station (Report 05000336/2004001 and 05000423/2004001) (Accession No. ML040630159)
March 4, 2004	Letter from David R. Lewis, Shaw Pittman LLP, to Annette Vietti-Cook, Secretary for the Commission, NRC, objecting to the March 1, 2004, Nancy Burton letter and emphasizing that the Burton Petition to Intervene was still premature (Accession No. ML040760961)
March 4, 2004	Letter from the Secretary to Nancy Burton Returning Millstone Intervention Petition (Accession No. ML040760940)
March 8, 2004	Determination of acceptability and sufficiency for docketing, proposed review schedule, and opportunity for a hearing regarding the applications from Dominion Nuclear Connecticut, Inc. for renewal of the operating licenses for the Millstone Power Station, Units 2 and 3 (TAC Nos. MC1825 and MC1826) (Accession No. ML040680968)
March 10, 2004	Letter from Margaret J. Bupp and Catherine L. Marco, Office of General Counsel, NRC, to Annette Vietti-Cook, Secretary for the Commission, NRC, stating that Connecticut Coalition Against Millstone's petition to intervene and a request for hearing filed February 12, 2004, is premature (Accession No. ML040830141)
March 12, 2004	Press Release 04-033 from NRC News announcing opportunity for hearing on application to renew Millstone Nuclear Plant, Units 2 and 3, operating licenses (Accession No. ML040720480)
March 16, 2004	Request for Party Status and Designation of Representative, per Millstone, Units 2 and 3, Applications for Renewed Operating Licenses (Accession No. ML040790721)
March 19, 2004	Request for Withholding Information From Public Disclosure From Millstone Units 2 and 3, granted (Accession No. ML040820974)
March 22, 2004	Motion to Vacate NRC Secretary Determination of Petition Prematurity and to Accept Petition to Intervene and Request for Hearing as of Date of Filing and to Apply 'Old' CFR Hearing Rules to Said Petition (Accession No. ML041040339)
March 24, 2004	Commission Order dated March 24, 2004 (Accession No. ML040850646)
March 30, 2004	March 8 and March 16, 2004, Telephone Summary Between the U.S. Nuclear Regulatory Commission (NRC) Staff and Dominion Nuclear Connecticut, Inc. Representatives to Discuss the Millstone Power Station, Units 2 and 3 License Renewal Applications (Accession No. ML040900525)

March 30, 2004	March 3, 2004, Telephone Summary Between the U.S. Nuclear Regulatory Commission (NRC) Staff and Dominion Nuclear Connecticut, Inc. Representatives to Discuss the Millstone Power Station, Units 2 and 3 License Renewal Applications (Accession No. ML040900469)
April 1, 2004	Acknowledgment of Receipt of Letters from Paul Eccard, First Selectman, Town of Waterford, Requesting Party Status and Designation of Representatives Regarding the Re-Licensing of Millstone Power Station, Units 2 and 3 (Accession No. ML040920601)
April 1, 2004	NRC Staff's Unopposed Motion for an Extension of Time to Respond to Connecticut Coalition Against Millstone's Petition to Intervene and Request for Hearing (Accession No. ML040930079)
April 2, 2004	Dominion's Answer to CCAM's Motion to Vacate Secretary Determination (Accession No. ML040990158)
April 2, 2004	NRC Staff's Response to Connecticut Coalition Against Millstone's Motion to Vacate and to Accept Petition to Intervene and Request for Hearing (Accession No. ML040970522)
April 2, 2004	Letter from David R. Lewis, Shaw Pittman, LLP, to Chief Administrative Judge Bollwerk re submission of Dominion's answer opposing CCAM's motion to vacate (Accession No. ML040990178)
April 14, 2004	Summary of Telephone Conference on April 8, 2004, Between the U.S. Nuclear Regulatory Commission and Dominion Nuclear Connecticut, Inc., Concerning Draft Requests for Additional Information Pertaining to the Millstone Power Station, Units 2 and 3, License Renewal Applications (Accession No. ML041050831)
April 22, 2004	Notice of May 7, 2004, Exit Meeting With Dominion Nuclear Connecticut, Inc. On License Renewal Scoping and Screening Methodology Audit for Millstone Power Station, Units 2 and 3 (Accession No. ML041130326)
May 4, 2004	SRM-M040504A - Affirmation Session: SECY-04-0066 - Dominion Nuclear Connecticut (Millstone Nuclear Power Station, Units 2 and 3) (Rejection by the Secretary of Petition to Intervene in License Renewal Proceedings as Premature (Accession No. ML041250488)
May 4, 2004	M040504A - Affirmation Session: SECY-04-0066 - Dominion Nuclear Connecticut (Millstone Nuclear Power Station, Units 2 and 3) (Rejection by Secretary of Petition) (Accession No. ML041260073)
May 4, 2004	Commission Memorandum and Order (CLI-04-12) (Accession No. ML041250232)
May 14, 2004	Motion for Reconsideration of CLI-04-12 (Accession No. ML041420177)

May 18, 2004	Commission Order denying CCAM's Motion for Reconsideration of CLI-04-12 (Accession No. ML041390500)
May 19, 2004	Establishment of Atomic Safety and Licensing Board (Accession No. ML041470149)
June 7, 2004	NRC Staff Answer to Petition to Intervene and Request for Hearing of Connecticut Coalition Against Millstone (Accession No. ML041600187)
June 7, 2004	Dominion's Answer to CCAM's Petition to Intervene and Request for Hearing (Accession No. ML041680556)
June 16, 2004	Connecticut Coalition Against Millstone Motion for Leave to File Reply to Licensee and NRC Staff Answers to Petition, Amended Petition and Declarations of CCAM's Members *NUNC PRO TUNC* (Accession No. ML041800056)
June 18, 2004	Notice of July 13, 2004, Exit Meeting With Dominion Nuclear Connecticut, on License Renewal Audits of aging Management Programs and Reviews for Millstone Power Station, Units 2 and 3 (Accession No. ML041700332)
June 25, 2004	Press Release 04-078 from NRC News announcing NRC Atomic Safety and Licensing Board to Hold Prehearing Conference June 30 on Proposed Millstone License Renewal (Accession No. ML041770406)
June 27, 2004	Connecticut Coalition Against Millstone Motion for Stay of Proceedings (Accession No. ML041910373)
June 30, 2004	Transcript of the Dominion Nuclear Connecticut Initial Prehearing Conference held in New London, CT on June 30, 2004; pp. 1-182 (Accession No. ML041950013)
July 7, 2004	Dominion Nuclear Connecticut Additional Information in Support of Applications for Renewed Operating Licenses (Accession No. ML041900407)
July 7, 2004	Dominion Nuclear Connecticut Additional Information in Support of Applications for Renewed Operating Licenses (Accession No. ML041900370)
July 9, 2004	Notice of Appeal of the Connecitcut Coalition Against Millstone regarding the decision of the Atomic Safety and Licensing Board Memorandum and Order (Accession No. ML042300617)
July 19, 2004	Unopposed Motion of Dominion Nuclear Connecticut, Inc. To Intervene (Accession No. ML042570109)
July 26, 2004	Dominion Nuclear Connecticut Response to Request for Additional Information License Renewal Applications (Accession No. ML042080210)

July 28, 2004	Memorandum and Order (Ruling on Standing and Contentions) (LBP-04-15) (Accession No. ML042110313)
August 8, 2004	Declaration of Ernest J. Sternglass (Accession No. ML042330247)
August 9, 2004	Connecticut Coalition Against Millstone Motion for Reconsideration and Request for Leave to Amend Petition (Accession No. ML042320548)
August 16, 2004	Federal Respondents' Motion to Dismiss (Accession No. ML042570117)
August 18, 2004	NRC Staff Response to Connecticut Coalition Against Millstone's Motion for Reconsideration and Request for Leave to Amend Petition (Accession No. ML042320500)
August 18, 2004	NRC Staff Answer to Notice of Appeal of Connecticut Coalition Against Millstone (Accession No. ML042320445)
August 18, 2004	Letter from David R. Lewis, Shaw Pittman LLP, regarding Connecticut Coalition Against Millstone's Notice of Appeal, dated August 9, 2004, (Accession No. ML042390031)
August 26, 2004	Response by Dominion Nuclear in Support of Motion to Dismiss, dated August 26, 2004, (Accession No. ML042610296)
September 3, 2004	Petitioner's Objection to Motion to Dismiss (Accession No. ML042610301)
September 9, 2004	Notice of September 22, 2004, Meeting with Dominion Nuclear Connecticut Regarding License Renewal for the Millstone Power Station, Units 2 and 3 (Accession No. ML042530373)
September 10, 2004	Federal Respondent's Reply to Petitioner's Objection to Motion to Dismiss (Accession No. ML042610304)
September 20, 2004	Audit Trip Report Regarding the Dominion Nuclear Connecticut, Inc., License Renewal Application for the Millstone Power Station, Units 2 and 3, Dated January 22, 2004, (Accession No. ML042640548)
September 20, 2004	Memorandum and Order (Denying Motion for Reconsideration and Request for Leave to Amend Petition) (Accession No. ML042640524)
October 8, 2004	Notice of October 20, 2004, Millstone Public Meeting with Dominion Nuclear Connecticut, Inc. to discuss team inspection covering scoping and aging management portions of Dominion's application for a renewed license (Accession No. ML042820632)
October 15, 2004	Press Release I-04-047 from NRC News announcing NRC, Dominion Nuclear To Discuss Inspections on Millstone License Renewal on October 20 (Accession No. ML042890059)

October 18, 2004	NRC Staff's Brief in Opposition to Appeal by Connecticut Coalition Against Millstone of LBP-04-15 and LBP-04-22 (Accession No. ML042930658)
October 18, 2004	Dominion Nuclear Connecticut's Brief in Opposition to the Appeals of Connecticut Coalition Against Millstone (Accession No. ML043010494)
October 19, 2004	E-mail from Brooke Poole to Administrative Judges and Participants regarding missing page 3 to Staff's Brief filed on October 18, 2004 (Accession No. ML043070098)
October 27, 2004	Audit and Review Plan for Plant Aging Management Reviews and Programs - Millstone Power Station, Units 2 and 3 (Accession No. ML043290430)
November 9, 2004	Dominion Nuclear Connecticut Response to Request for Additional Information for License Renewal Applications (Accession No. ML043200606)
December 3, 2004	Dominion Nuclear Connecticut Response to Request for Additional Information for License Renewal Applications (Accession No. ML043450341)
December 3, 2004	Millstone Power Station Unit 2 and Unit 3 - License Renewal Application Inspection Report Nos. 05000336/2004010, 05000423/2004010 (Accession No. ML043410193)
December 3, 2004	Millstone Power Station Unit 2 and Unit 3 - License Renewal Application Inspection Report Nos. 05000336/2004009, 05000423/2004009 (Accession No. ML043410201)
December 8, 2004	Commission Memorandum and Order (CLI-04-36) regarding Connecticut Coalition Against Millstone intervenor status (Accession No. ML043430498)
December 27, 2004	Letter from Annette Vietti-Cook, Secretary of the Commission, to Christine Malafi, Esq. responding to the County of Suffolk's December 17, 2004, Motion to Intervene (Accession No. ML043630023)
January 11, 2005	Dominion Nuclear Connecticut Response to Request for Additional Information for License Renewal Applications (Accession No. ML050190289)
January 12, 2005	Dominion Nuclear Connecticut Annual Update Information for License Renewal Applications (Accession No. ML050210041)
February 2, 2005	Audit and Review Report for Plant Aging Management Reviews and Programs for the Millstone Power Station - Units 2 & 3 Prepared by NRC (Accession No. ML050330059)

February 8, 2005	Letter from Dominion to the NRC regarding additional information in support of license renewal applications (Accession No. ML050460323)
February 15, 2005	Letter from Dominion to the NRC regarding additional information in support of license renewal applications (Accession No. ML050550068)
February 24, 2005	Letter from NRC to Dominion transmitting the Safety Evaluation Report with Open Items Related to License Renewal of MPS (Accession No. ML050600172)
April 1, 2005	Letter from Dominion to NRC regarding response to SER with Open Items (Accession No. ML051020128)
April 19, 2005	Letter from Dominion to NRC regarding license renewal comments on SER with Open Items (Accession No. ML051100470)
June 2, 2005	Letter from Dominion to NRC regarding additional information in support of license renewal applications (Accession No. ML051590137)
July 14, 2005	Letter from Dominion to NRC regarding additional information in support of license renewal applications (Accession No. ML051960166)
July 21, 2005	Letter from Dominion to NRC regarding additional information in support of license renewal applications

APPENDIX C: PRINCIPAL CONTRIBUTORS

NAME	RESPONSIBILITY
F. Akstulewicz	Management Oversight
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Information Systems Laboratories	GALL Audit/Plant Systems
Legin Group, Inc.	SER Support

APPENDIX D: REFERENCES

This appendix contains a listing of references used in the preparation of the Safety Evaluation Report prepared during the review of the license renewal application for Millstone Power Station, Units 2 and 3, Docket Numbers 50-336 and 50-423, respectively.

(1) NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” April 2001

(2) NEI 95-10, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule, Revision 3,” August 2001

(3) NUREG-1801, “Generic Aging Lessons Learned Report (GALL),” April 2001

(4) Letter From NRC to Dominion Nuclear Connecticut, Inc., “Request For Additional Information (RAI) Regarding The License Renewal Application For The Millstone Power Station, Units 2 and 3”

(5) MPS License Renewal Technical Report MP-LR–3/4000, “System/Structure Scoping”

(6) MPS License Renewal Technical Report MP-LR–3/4002, “Fire Protection,” Revision 2

(7) MPS License Renewal Technical Report MP-LR–3/4003, “Anticipated Transient Without Scram,” Revision 2

(8) MPS License Renewal Technical Report MP-LR–3/4004, “Pressurized Thermal Shock,” Revision 0

(9) MPS License Renewal Technical Report MP-LR–3/4005, “Fire Protection,” Revision 4

(10) MPS License Renewal Technical Report MP-LR–3/4006, “Station Blackout,” Revision 3

(11) MPS License Renewal Technical Report MP-LR–3/4901, “Treatment of Consumables”

(12) MPS License Renewal Technical Report MP-LR–3/4903, “Interim Staff Guidance”

(13) MPS License Renewal Technical Report MP-LR-3655/4655, “Aging Management Review Cables and Connectors”

(14) MPS License Renewal Technical Report MP-LR-3656/4656, “Aging Management Review Bus Ducts”

(15) MPS License Renewal Technical Report MP-LR-3657, “Aging Management Review Electrical Penetrations”

(16) MPS License Renewal Technical Report MP-LR-3920/4920, “Review of Stored Equipment Millstone Power Station”

(17) Letter from Ashok Thadani, Director of Nuclear Regulatory Research, To William Travors, Executive Director of Operations, “Closeout of Generic Safety Issue 190, (Fatigue Evaluation of Metal Components For 60 Year Plant Live),” December 1999