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1.0 ADMINISTRATIVE INFORMATION

Dominion Nuclear Connecticut, Inc. (hereinafter known as Dominion) is filing separate License Renewal Applications (LRA) for Millstone Power Station Units 2 and 3 under the same cover letter.

This application has been prepared to provide the administrative, technical and environmental information required by 10 CFR Part 54 (Reference 1.6-1) and 10 CFR Part 51 (Reference 1.6-2) to support the renewal of the Operating License for:

Millstone Unit 2 - License No. DPR-65

The License Renewal Application is contained on a CD-ROM. For the reviewer's convenience, the CD-ROM also contains copies of the Final Safety Analysis Report and the license renewal drawings prepared in support of the license renewal effort. Hyperlinks to those documents are provided in the application where appropriate.

The FSAR, LR drawings, and other references cited within the application are for information only, and are not incorporated by reference into the LRA.

This section of the application provides the following information:

1. Information on the organization of the application (Section 1.1),
2. A general plant description (Section 1.2),
3. Information on the applicant (Section 1.3),
4. Summary of abbreviations (Section 1.4), and
5. A distribution list for written communications related to the application (Section 1.5).

1.1 APPLICATION FORMAT AND CONTENT

The following discussion describes the content of the Millstone Unit 2 License Renewal Application. In general the overall outline of the License Renewal Application is constructed as described in NEI 95-10, Rev. 4(Reference 1.6-4), using the Standard License Renewal Application (SLRA) format.

Section 1.0, Administrative Information, provides the administrative information required by 10 CFR 54.17 and 10 CFR 54.19. The section has been expanded to provide (1) information on the format and content of the application, (2) a general plant description, (3) the required applicant information, (4) a summary of abbreviations used in the application, and (5) a distribution list for written communications related to the application.

Section 2.0, Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review and Implementation Results, provides the scoping and screening methodology used to develop this application. Section 3.0, Aging Management Review Results, describes the results of the aging management reviews for the components and structures requiring aging management reviews. The system groupings in Sections 2 and 3 are organized to be consistent with NUREG-1800 (Reference 1.6-5), with the following exceptions:

- Containment isolation systems are not presented under Engineered Safety Features Systems. Containment isolation valves and the associated piping are evaluated as components within their respective process systems. Mechanical containment penetrations and the penetration sleeve portion of electrical containment penetrations have been evaluated as structural components in Section 2.4.1, Containment. The electrical penetration assemblies within the scope of the Environmental Qualification (EQ) Program are the subject of a time-limited aging analysis as described in Section 4.4, Environmental Qualification of Electric Equipment. The screening results for the non-EQ penetration assemblies are provided in Section 2.5.2, Electrical Penetrations.
- New and spent fuel storage are not presented under Auxiliary Systems. New and spent fuel storage have been evaluated as structural components in the Auxiliary Building. See Section 2.4.2.2, Unit 2 Auxiliary Building.
- Overhead load handling systems are not presented under Auxiliary Systems. Load handling systems have been evaluated as structural components. See Section 2.4.6, Load Handling Cranes and Devices.

Section 2.0 describes the process for identifying the structures and components subject to aging management review and provides the scoping and screening results for those components, subcomponents, structural members, and commodity groups that are subject to AMR. The following tables identify those plant systems and structures that are in the scope of license renewal and those that are not within the scope of license renewal:

- Table 2.2-1, Systems Within the Scope of License Renewal,
- Table 2.2-2, Systems Not Within the Scope of License Renewal,
- Table 2.2-3, Structures Within the Scope of License Renewal, and
- Table 2.2-4, Structures Not Within the Scope of License Renewal.

Section 2.3, Section 2.4, and Section 2.5 provide the mechanical, structural, and electrical/I&C screening results, respectively.

Section 3.0 provides the results of the aging management reviews of structures and components, and includes a comparison of these results with the evaluation in NUREG-1801 (Reference 1.6-6), using the NUREG-1801 system grouping.

Section 4.0, Time-Limited Aging Analyses, includes a list of time-limited aging analyses (TLAAs), as defined by 10 CFR 54.3. It includes the identification of the component or subject, and an explanation of the time dependent aspects of the calculation or analysis.

Appendix A, Final Safety Analysis Report Supplement, contains a summary description of the programs for managing the effects of aging for the period of extended operation. A summary description of the evaluation of time-limited aging analyses for the period of extended operation is also included. The license renewal commitments are identified in Table A6.0-1, License Renewal Commitments.

Appendix B, Aging Management Programs, describes the aging management programs used for managing the aging effects on systems, structures, and components within the scope of license renewal and demonstrates that the aging effects will be managed such that the systems, structures, and components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. Where the Millstone Unit 2 programs are consistent with corresponding programs in NUREG-1801, the appropriate NUREG-1801 program is referenced.

Appendix C, Aging Management Review Methodology, describes the methodology for performing the aging management review (AMR) of the long-lived passive components and structural members within the scope of license renewal. Section C2.0 provides an overview of the AMR process, including the process for identifying the in-scope passive components that are short-lived and, therefore, do not require an AMR. Section C3.0 provides a discussion of the aging effects and associated mechanisms evaluated for structures and components.

Appendix D, Technical Specification Changes, concludes that no technical specification changes are necessary to manage the effects of aging during the period of extended operation.

Appendix E, Environmental Report, contains an environmental report analyzing the potential environmental impacts of license renewal, as provided for in NRC regulations 10 CFR51.53(c) and 10 CFR 54.23.

1.2 PLANT DESCRIPTION

Millstone Unit 2 is located on an approximately 500 acre site in the town of Waterford, Connecticut, on the north shore of Long Island Sound. Millstone Unit 2 is a two steam generator, four-coolant-loop, pressurized light water reactor nuclear steam supply system supplied by Combustion Engineering, Inc. and a turbine generator furnished by General Electric Corporation. The balance of plant was originally designed and constructed by Northeast Nuclear Energy Company with the assistance of its agent, Bechtel Corporation. The reactor unit was initially operated at a licensed power output of 2560 MWt, with a gross electrical output of approximately 865 MWe.

In 1979, the unit was uprated to a core power output of 2700 MWt with a gross electrical output of approximately 895 MWe.

Millstone Unit 2 shares the site with Millstone Unit 1, a permanently defueled boiling water reactor nuclear unit, and Millstone Unit 3, a pressurized water reactor nuclear unit.

1.3 INFORMATION REQUIRED BY 10 CFR 54.17 AND 10 CFR 54.19

1.3.1 NAME OF APPLICANT

Dominion, which is the operator and sole owner of Millstone Unit 2, is the applicant.

1.3.2 ADDRESS OF APPLICANT

Dominion Nuclear Connecticut, Inc.
120 Tredegar Street
Richmond, VA 23219

1.3.3 DESCRIPTION OF BUSINESS OR OCCUPATION OF APPLICANT

Dominion was incorporated in 2000 to own and operate Millstone Power Station. Dominion is an Exempt Wholesale Generator that sells electricity at wholesale to rural electric cooperatives, power marketers, municipalities, and other utilities.

Dominion is an indirect, wholly owned subsidiary of Dominion Resources, Inc. Dominion Resources, Inc. is an integrated supplier of energy and energy services.

1.3.4 ORGANIZATION AND MANAGEMENT OF APPLICANT

Dominion is not owned, controlled or dominated by an alien, a foreign corporation, or a foreign government. All officers and directors are citizens of the United States of America. The names and addresses of the directors and principal officers are provided below:

<u>Dominion - Directors</u>

Name	Address

David A Christian	Innsbrook Technical Center-2SW 5000 Dominion Boulevard Glen Allen, VA 23060
Thomas F. Farrell, II	120 Tredegar Street, 3rd Floor Richmond, VA 23261
Mark F. McGettrick	120 Tredegar Street, 3rd Floor Richmond, VA 23219

Dominion - Principal Officers

Name	Address
Mark F. McGettrick President and Chief Executive Officer - Generation	120 Tredegar Street, 3rd Floor Richmond, VA 23219
David A. Christian Senior Vice President - Nuclear Operations and Chief Nuclear Officer	Innsbrook Technical Center - 2SW 5000 Dominion Boulevard Glen Allen, VA 23060
G. Scott Hetzer Senior Vice President and Treasurer	100 Tredegar Street, 3rd Floor Richmond, VA 23219
William R. Matthews Senior Vice President - Nuclear Operations	Rope Ferry Road Waterford, CT 06385
Pamela F. Faggert Vice President - Chief Environmental Officer	Innsbrook Technical Center - 1SE 5000 Dominion Boulevard Glen Allen, VA 23060
Eugene S. Grecheck Vice President - Nuclear Support Services	Innsbrook Technical Center, 2 SE 5000 Dominion Boulevard Glen Allen, VA 23060
Leslie N. Hartz Vice President - Nuclear Engineering	Innsbrook Technical Center 2E 5000 Dominion Boulevard Glen Allen, VA 23060-6711
James K. Martin Vice President - Business Development	120 Tredegar Street 4th Floor Richmond, VA 23219

Patricia A. Wilkerson Vice President and Secretary	100 Tredegar Street, 3rd Floor Richmond, VA 23219
J. Alan Price Site Vice President - Millstone	Rope Ferry Road Waterford, CT 06385
Lee D. Katz Controller	120 Tredegar Street, 3rd Floor Richmond, VA 23219
James P. Carney Assistant Treasurer	100 Tredegar Street, 2rd Floor Richmond, VA 23219
E. J. Marks, III Assistant Secretary	100 Tredegar Street, 2rd Floor Richmond, VA 23219
Jerry G. Overman Assistant Treasurer	100 Tredegar Street, 3rd Floor Richmond, VA 23219

1.3.5 CLASS OF LICENSE, USE OF FACILITY, AND PERIOD OF TIME FOR WHICH THE LICENSE IS SOUGHT

Dominion requests renewal of the operating license for a period of 20 years beyond the expiration date of the current operating license as shown below:

Unit	License No.	License Class	Expiration Date
2	DPR-65	104b	July 31, 2015

Dominion also requests renewal of the source, special nuclear material, and by-product licenses that are included within the operating license and that were issued pursuant to 10 CFR Parts 30, 40, and 70.

1.3.6 EARLIEST AND LATEST DATES FOR ALTERATIONS, IF PROPOSED

Dominion does not propose to alter the unit in connection with this application. The current licensing basis (CLB) will be continued and maintained throughout the period of extended operation.

1.3.7 LISTING OF REGULATORY AGENCIES HAVING JURISDICTION AND NEWS PUBLICATIONS

The Federal Energy Regulatory Commission is the principal regulator of Dominion's electric operations in Connecticut.

Magalie Roman Salas
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Arthur J. Rocque, Jr., Commissioner
Department of Environmental Protection
79 Elm Street, Hartford, CT 06106-5127

The area news publications and their associated addresses are provided below

The Day
47 Eugene O'Neill Dr
New London, CT 06320-6306

Hartford Courant
285 Broad St.
Hartford, CT 06105-3785

Norwich Bulletin
66 Franklin St.
Norwich, CT 06360-5806

1.3.8 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

10 CFR 54.19(b) requires that license renewal applications 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 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.

1.3.9 RESTRICTED DATA AGREEMENT

This application does not contain restricted data or other national defense information, nor is it expected that subsequent amendments to the license application will contain such information. However, pursuant to 10 CFR 54.17(g) and 10 CFR 50.37, Dominion, as a part of the application for renewed operating licenses, hereby agrees that it will not permit any individual to have access to, or any facility to possess, Restricted Data or classified National Security Information until the individual and/or facility has been approved for such access under the provisions of 10 CFR Parts 25 and/or 95.

1.3.10 FINANCIAL QUALIFICATION

Pursuant to 10 CFR 50.33(f)(2), this section provides financial information demonstrating that Dominion possesses or has reasonable assurance of obtaining the funds necessary to cover estimated operating costs. The financial data presented with this application consists of the projected revenue, taxes and interest, and operating expenses for the five year period starting in 2006, the projected year of renewed license approval. Table 1.3-1 provides these projections and information regarding the market price and capacity factor assumptions.

Table 1.3-1 Projected Income Statement 2006-2010 Revenue Based on Market Prices ($ in Millions)

	Total 2006	Total 2007	Total 2008	Total 2009	Total 2010
Total Revenue*	[		**Company Confidential Information**		]
Total Operating Expenses					
Income Before Taxes & Interest					
Total Taxes & Interest					
Net Income					

*Note: Revenue shown above is based on the following:

	5 Yr. Avg.
Projected Market Prices	[**Company Confidential Information**]
Projected Capacity Factor	

Variations in market pricing and capacity factors will impact the Projected Income Statement in the table above. In order to assess the reasonableness of these projections, sensitivity analyses based on lower market prices and historical capacity factors are provided in Table 1.3-2 and Table 1.3-3, respectively.

Table 1.3-2 Projected Income Statement 2006-2010 Revenue Based on Market Prices Dropping by 10% ($ in Millions)

	Total 2006	Total 2007	Total 2008	Total 2009	Total 2010
Total Revenue	Company Confidential Information				
Total Operating Expenses					
Income Before Taxes & Interest					
Total Taxes & Interest					
Net Income					

Table 1.3-3 Projected Income Statement 2006-2010 Revenue Based on Historical Capacity Factor ($ in Millions)

	Total 2006	Total 2007	Total 2008	Total 2009	Total 2010
Total Revenue	Company Confidential Information				
Total Operating Expenses					
Income Before Taxes & Interest					
Total Taxes & Interest					
Net Income					

Note: Unit 2 historical capacity factor is based on May, 1999 to July, 2003

Unit 2 did not return to operation from regulatory shutdown until May, 1999.

Unit 3 historical capacity factor is for five years through July, 2003

Average Capacity Factor - 87%

1.4 ABBREVIATIONS

This section contains the abbreviations that pertain to the administrative and technical information within the LRA. The abbreviations that pertain to the environmental information are included in the front of Appendix E (Environmental Report).

Abbreviation	Definition
ΔRT_{NDT}	Irradiation induced shift in the Reference Nil Ductility Transition Temperature.
AAC	Alternate Alternating Current
AC	Air Conditioning
AC	Alternating Current
ACI	American Concrete Institute
AHU	Air Handling Unit
AISC	American Institute of Steel Construction
AMP	Aging Management Program
AMR	Aging Management Review
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 Rector

Abbreviation	Definition
CASS	Cast Austenitic Stainless Steel
CEA	Control Element Assembly
CEDM	Control Element Drive Mechanism
CFR	Code of Federal Regulations
cfs	cubic feet per second
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
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
ECT	Eddy Current Testing
EEQ	Electrical Equipment Qualification

Abbreviation	Definition
EFPD	Effective Full Power Days
EFPH	Effective Full Power Hours
EFPY	Effective Full Power Years
ELD	Electronic Licensing Documentation Database
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 Features
ETA	Ethanolamine
FAC	Flow Accelerated Corrosion
FHA	Fire Hazards Analysis
FP	Fire Protection
FSAR	Final Safety Analysis Report
GALL	NUREG-1801, “Generic Aging Lessons Learned Report”
GDC	General Design Criterion
GEIS	Generic Environmental Impact Statement
GL	Generic Letter
gpm	gallons per minute

Abbreviation	Definition
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, Ventilating, and Air Conditioning
IASCC	Irradiation Assisted Stress Corrosion Cracking
ICI	Incore Instrumentation
IEEE	Institute of Electrical and Electronics Engineers
IGSCC	Intergranular Stress Corrosion Cracking
ILRT	Integrated Leak Rate Test
IN	Information Notice
INPO	Institute of Nuclear Power Operations
IPA	Integrated Plant Assessment
ISG	Interim Staff Guidance
ISI	Inservice Inspection
kV	kilovolt
LBB	Leak Before Break
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LLRT	Local Leak Rate Testing
LOCA	Loss-of-Coolant Accident
LR	License Renewal
LRA	License Renewal Application

Abbreviation	Definition
LRIMS	License Renewal Information Management System.
LTOP	Low Temperature Overpressurization Protection
MAER	Material Aging Effects Report
MCC	Motor Control Center
MEPL	Materials and Equipment Parts List
MIC	Microbiologically Induced Corrosion
MMOD	Minor Modification
MOV	Motor Operated Valve
MR	Maintenance Rule
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	Megawatts-Thermal
NACE	National Association of Corrosion Engineers
NCFM	Nuclear Component Fatigue Management
NDE	Non-destructive Examination
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPRDS	Nuclear Plant Reliability Data System
NRC	Nuclear Regulatory Commission

Abbreviation	Definition
NS	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
PM	Preventative Maintenance
PMMS	Production Maintenance Management System.
PNNL	Pacific Northwest National Laboratory
ppb	Parts Per Billion
ppm	Parts Per Million
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
RCCA	Rod Cluster Control Assembly
RCD	Regulatory Commitment Database
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RI-ISI	Risk Informed - Inservice Inspection

Abbreviation	Definition
RG	Regulatory Guide
RPV	Reactor Pressure Vessel
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
RWST	Refueling Water Storage Tank
SAMA	Severe Accident Mitigation Alternative
SBO	Station Blackout
SCBA	Self Contained Breathing Apparatus
SCC	Stress Corrosion Cracking
SER	Safety Evaluation Report
SFRM	Safety Function Requirements Manual
SG	Steam Generator
SI	Safety Injection
SIAS	Safety Injection Actuation Signal
SPCS	Steam and Power Conversion Systems
SR	Safety-Related
SRP	Standard Review Plan

Abbreviation	Definition
SSC	System, Structure, and Component
TGSCC	Transgranular Stress Corrosion Cracking
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
VAC	Voltage Alternating Current
VETIP	Vendor Equipment Technical Information Program
VT	Visual Test
WINCDMS	Chemistry Data Management System
WOG	Westinghouse Owner’s Group
XLPE	Cross-linked Polyethylene

1.5 COMMUNICATIONS

Written communications regarding this application should be directed to:

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300 N Street, N.W.
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1.6 REFERENCES

1.6-1 10 CFR 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*, U.S. Nuclear Regulatory Commission.

1.6-2 10 CFR 51, *Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions*, U.S. Nuclear Regulatory Commission.

1.6-3 Regulatory Issue Summary (RIS) 2001-05, G*uidance on Submitting Documents to the NRC By Electronic Information Exchange or on CD-ROM*, U.S. Nuclear Regulatory Commission.

1.6-4 NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 -The License Renewal Rule*, Rev. 4, Nuclear Energy Institute.

1.6-5 NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, July 2001.

1.6-6 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report,* U.S. Nuclear Regulatory Commission, April 2001.

2.0 SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW AND IMPLEMENTATION RESULTS

This section describes the process for identifying the structures and components subject to aging management review and provides the scoping and screening results for those components, subcomponents, structural members, and commodity groups that are subject to AMR per Section 3.0 of this application.

A listing of the abbreviations used in Section 2.0 is provided in Section 1.4.

INTENDED FUNCTION ABBREVIATIONS AND DEFINITIONS

Table 2.0-1, Intended Functions: Abbreviations & Definitions, contains the meanings for the abbreviations used in the Screening and AMR results tables to represent the intended functions for components, subcomponents, structural members, and commodity groups.

Table 2.0-1 Intended Functions: Abbreviations & Definitions

Intended Function	Abbreviation	Definition
Conducts Electricity	CE	Conducts electricity.
Enclosure Protection	EN	Provides enclosure, shelter, or protection for in-scope equipment (including radiation shielding and pipe whip restraint).
EQ Barrier	EQB	Provides EQ Barrier and/or HELB Barrier
Fire Barrier	FB	Provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
Flood Barrier	FLB	Provides a protective barrier for internal/external flooding events.
Flow Distribution	FD	Provides for flow distribution.
Filtration	FLT	Provides filtration.
Heat Sink	HS	Provides a heat sink during SBO or design basis accidents.

Table 2.0-1 Intended Functions: Abbreviations & Definitions

Intended Function	Abbreviation	Definition
Heat Transfer	HT	Provides for heat transfer.
Insulate	IN	Insulates electrical conductors.
Jet Impingement Shield	JIS	Provides jet impingement shielding for high energy line breaks.
Limited Structural Integrity	LSI	Provides limited structural integrity.
Limit Thermal Cycling	LTC	Limits thermal cycling.
Missile Barrier	MB	Provides a missile (internal or external) barrier.
Pressure Boundary	PB	Provides a pressure boundary.
Restricts Flow	RF	Restricts flow.
Source of Cooling	SCW	Provides a source of cooling water for plant shutdown.
Structural Support [Criteria (a)(2) & (a)(3)]	SNS	Provides structural and/or functional support to equipment meeting 10CFR54.4(a)(2) or (a)(3).
Spray Pattern	SP	Provides a spray pattern.
Structural Support	SS	Provides structural and/or functional support related to mechanical components.
Structural Support [Criterion (a)(1)]	SSR	Provides structural and/or functional support to equipment meeting 10CFR54.4(a)(1).
Vortex Suppression	VS	Provides for vortex suppression.

2.1 SCOPING AND SCREENING METHODOLOGY

2.1.1 INTRODUCTION

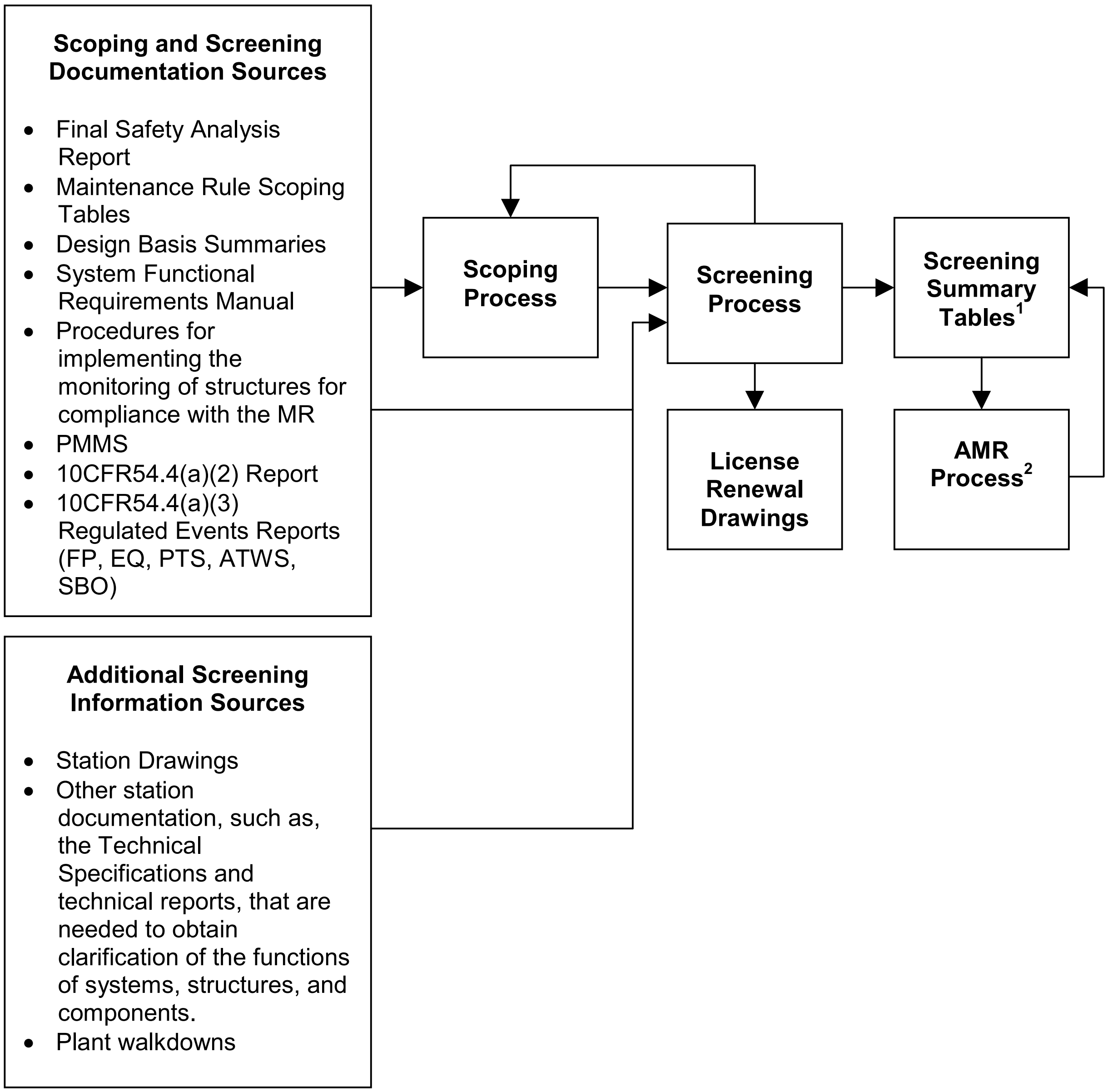
The first step in the Integrated Plant Assessment involved the identification of the plant Systems, Structures, and Components that are within the scope of license renewal and that require an aging management review. This section provides the information that meets the requirements of 10 CFR 54.21(a)(1) and (a)(2).

Scoping and screening were performed consistent with the guidelines presented in NEI 95-10 (Reference 2.1-1) with the following clarifications:

- Scoping and screening were performed as an integrated review. Scoping was performed at the system/structure level. Screening was performed on a component level basis and the scoping results were then reviewed and revised as required to be consistent with the screening results.
- The screening process identified in-scope passive components. 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 (see Appendix C, Section C2.3, Identification of Short-lived Components and Consumables).

A simplified flow chart, showing the relationship between the scoping and screening processes for mechanical systems and components, is provided in Figure 2.1-1. 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. Section 2.1.4 and Section 2.1.5 describe the scoping and screening methodology.

Figure 2.1-1 Simplified Scoping and Screening Process Flow Chart



1. Short-lived components, identified during the AMR process, are not included in the screening summary tables.
2. The AMR process methodology is described in Appendix C.

2.1.2 APPLICATION OF THE SCOPING CRITERIA IN 10 CFR 54.4(a)

10 CFR 54.4(a)(1), (a)(2) and (a)(3) contain criteria for including systems, structures, and components within the scope of license renewal. The application of these criteria to plant SSCs is discussed in Section 2.1.2.1, Section 2.1.2.2, and Section 2.1.2.3.

2.1.2.1 10 CFR 54.4(a)(1) - SAFETY-RELATED

10 CFR 54.4(a)(1) requires that plant SSCs within the scope of license renewal include safety-related SSCs, which are those relied upon to remain functional during and following design basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions:

(i) The integrity of the reactor coolant pressure boundary;

(ii) The capability 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 off-site exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.

The quality classifications established in the Production Maintenance Management System (PMMS) for uniquely numbered plant components are consistent with the safety-related definitions presented in 10 CFR 50.49(b)(1) and are based on reviews of plant accident analyses and evaluations. Therefore, Dominion used these classifications for the identification of components meeting the requirements of 10 CFR 54.4(a)(1).

The classification and identification of plant components within PMMS are discussed in Section 2.1.3.4. The use of PMMS during scoping and screening is discussed in Section 2.1.4 and Section 2.1.5, respectively.

2.1.2.2 10 CFR 54.4(a)(2) - NON-SAFETY-RELATED AFFECTING SAFETY-RELATED

10 CFR 54.4(a)(2) requires that plant SSCs within the scope of license renewal include non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for 10 CFR 54.4(a)(1).

A review of the FSAR, operating experience, and current license basis documentation was performed to provide the guidelines and the sources of information to be used as input to scoping and screening. This information was augmented by plant walkdowns. The results are discussed in Section 2.1.3.6, 10 CFR 54.4(a)(2) Report.

2.1.2.3 10 CFR 54.4(a)(3) - REGULATED EVENTS

10 CFR 54.4(a)(3) requires that plant SSCs within the scope of license renewal include SSCs relied on in safety analyses or plant evaluations to 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).

For each of these regulated events, a report was prepared to provide input into the scoping and screening processes. These reports (1) identified the systems and structures that are relied on for each of the regulated events, and/or (2) either identified specific components, or pointed to the documentation to be used as input for screening. The regulated event reports are discussed in Section 2.1.3.7, Regulated Event Reports.

2.1.3 DOCUMENTATION SOURCES USED FOR SCOPING AND SCREENING

2.1.3.1 FINAL SAFETY ANALYSIS REPORT

The Final Safety Analysis Report was used as a primary source for system function identification for both the Maintenance Rule and the Design Basis Summary documents. The Maintenance Rule and the Design Basis Summary documents were used extensively in system scoping, which resulted in the FSAR having been used indirectly as a primary source in system scoping. Additionally, the FSAR was used to identify system functions when other documents did not provide that information and as a source for the CLB interactions that are documented in the 10 CFR 54.4(a)(2) Report.

The FSAR was also the primary source used in the scoping of structures to provide the following:

- safety classification of structures, structural members, and structural areas,
- structure descriptions, and
- structural functions.

2.1.3.2 MAINTENANCE RULE DOCUMENTATION

The Maintenance Rule Project included the development of a new baseline for scoping, ranking risk, and developing performance criteria to comply with the requirements established in 10 CFR 50.65, *“Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants”*. The resulting Maintenance Rule scoping document was used as a source of system functions for license renewal scoping.

2.1.3.3 DESIGN BASIS SUMMARIES

Design Basis Summaries were previously prepared for selected systems and were used as a source of design basis information in the planning of unit modifications, technical reviews, safety evaluations, and other design related activities. The DBS provided a list of functions that was used to identify license renewal intended functions.

2.1.3.4 PRODUCTION MAINTENANCE MANAGEMENT SYSTEM

PMMS is a multi-faceted program encompassing, in part, an equipment information database and the plant work order subsystem. PMMS also provides for the identification of relevant engineering and quality classification information and specific component information.

The equipment information database or ID database portion of PMMS, contains related engineering and design information for each uniquely identified plant component (local ID) in PMMS. For each component this includes such data as the following:

- component identification nomenclature,
- nameplate data,
- drawing and technical manual references,
- procedures, and
- a bill of materials.

The PMMS database also provides quality classification information and engineering program applicability for each component in the database. The quality classification information includes the identification of QA Category 1 (safety-related) and non-safety-related 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 non-safety-related components:

- Rad Waste
- Fire Protection
- Anticipated Transients Without Scram
- Station Blackout

The PMMS database also indicated the applicability of sixteen 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.

2.1.3.5 SAFETY FUNCTIONAL REQUIREMENTS MANUAL

The Safety Functional Requirements Manual identifies and documents the key system level requirements that are reflected in the safety analyses. The SFRM provides additional information beyond that provided in the FSAR Chapter 14, Accident Analysis.

The SFRM was used to identify intended functions for various systems during the scoping process.

2.1.3.6 10 CFR 54.4(a)(2) REPORT

A review of the FSAR, operating experience, and CLB documents in Section 2.1.3.1 through Section 2.1.3.5, was performed to identify the non-safety-related SSCs whose failure could prevent satisfactory accomplishment of the SR functions identified in 10 CFR 54.4(a)(1). The review encompassed the design basis events and hypothetical failures considered within these documents. The NS 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 results of the review were incorporated into a 10 CFR 54.4(a)(2) Report, which was used as input to scoping and screening. The report identified the following categories of NS SSCs for inclusion within the scope of license renewal for 10 CFR 54.4(a)(2):

1. NS SSCs relied on to mitigate or prevent flooding events.
2. NS SSCs relied on to mitigate a high energy line break outside Containment.
3. NS piping that is attached to SR piping and that is seismically designed and supported up to the first equivalent anchor point beyond the SR/NS boundary.
4. Supports for NS SSCs that are in close proximity to SR SSCs such that support system failure during a seismic event could result in adverse interaction with SR SSCs (Seismic II/I). Also, non-safety-related load handling cranes and devices that are seismically designed are included in this Seismic II/I category.
5. NS components containing liquids or steam that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC.

These items were addressed during screening as explained below:

- NS SSCs in the first two categories discussed above were individually identified during screening using the guidelines and documentation sources referenced within the 10 CFR 54.4(a)(2) Report.
- The NS 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/NS boundary, is included within the scope of the license renewal. Although these NS piping segments are not uniquely identified during the screening process nor highlighted on LR drawings, applicable aging effects for these piping segments are managed along with the adjoining SR piping.
- The supports for NS SSCs that could adversely interact with SR SSCs as a result of a seismic event (Seismic II/I) were not individually identified during screening. 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 or not. In this manner, supports and structural members that provide a function related to Seismic II/I criteria are included in scope without the need to uniquely identify the related Seismic II/I functional requirements. Piping and component supports, and supports for miscellaneous lifting devices, are examples of SSCs that were included in scope for Seismic II/I. Load handling cranes and devices that are seismically-designed were individually identified and included in scope for Seismic II/I.

- Plant walkdowns were performed to identify NS components containing liquids or steam that are spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. These components are relied on to maintain their structural integrity and pressure boundary integrity to ensure that the safety-related components in the vicinity can perform their safety-related function and are, therefore, included within the scope of license renewal.

2.1.3.7 REGULATED EVENT REPORTS

A report was prepared for each of the five regulated events covered in 10 CFR 54.4(a)(3) to provide input to the scoping and screening processes. This section provides a discussion of each of those reports.

2.1.3.7.1 Fire Protection

The Fire Protection Program was developed to maintain compliance with 10 CFR 50.48 and Appendix R to 10 CFR 50 by meeting the following objectives in fire areas important to safety:

- Reduce the likelihood of fires.
- Promptly detect and extinguish fires that do occur.
- Maintain safe-shutdown capability if a fire does occur.
- Prevent release of a significant amount of radioactive material if a fire does occur.

A review was performed to identify the specific SSCs that fall within the scope of license renewal for fire protection, including the SSCs relied upon in the Fire Hazards Analysis. As a result of that review, the following features and equipment were included within the scope of license renewal for fire protection:

- Fire detection and suppression equipment,
- Passive features (includes reactor coolant pump lube oil collection components, dikes, curbs, and drains),
- Fire-rated assemblies (includes walls, floors, ceilings, cable tray enclosures, and other fire barriers),

- Fire-rated penetrations assemblies (including fire doors, fire dampers, cable, piping, and ventilation duct penetration seals),
- Manual fire fighting equipment (hydrants, hose stations, extinguishers, etc.),
- Ventilation (smoke removal),
- Emergency lighting (fire safe shutdown and life safety lighting),
- Safe shutdown equipment (Appendix R), and
- Fire fighting support (communications, lighting, bottled air)

The screening methodology was applied to the post-fire repair equipment that is maintained in storage and is discussed in Section 2.1.5.5, Screening of Stored Equipment.

2.1.3.7.2 Environmental Qualification

The Millstone EEQ program was developed to maintain compliance with 10 CFR 50.49. The program applies to the following electrical equipment that is important to safety and is located in a harsh environment:

- Safety-related electrical equipment that is relied on to remain functional during and following a design basis accident.
- Non-safety-related electrical equipment whose failure, under postulated environmental conditions, could prevent accomplishment of safety functions.
- Category 1 and 2 post-accident monitoring equipment described in Millstone Unit 2 response to Regulatory Guide 1.97.

The DOR Guidelines delineated in IE Bulletin 79-01B (Reference 2.1-5) is the qualification basis.

The electrical components that fall within the scope of the EEQ program are identified on the Environmental Qualification Master List and PMMS (Section 2.1.3.4). Components that provide a barrier between mild and harsh areas of the plant, such as doors, penetrations, seals, dampers, walls, and floors, were also included within the scope of license renewal.

2.1.3.7.3 Pressurized Thermal Shock

10 CFR 50.61 requires that each licensee project a value for the reference temperature for pressurized thermal shock for the limiting reactor vessel materials for end-of-life neutron fluence. The licensee is also required to implement those flux reduction programs, plant modifications and/or operational changes that are reasonably practicable to avoid exceeding the pressurized thermal shock screening criteria set forth in 10 CFR 50.61.

The evaluation of reactor pressure vessel material RT_{PTS} is provided in Section 4.2, Reactor Vessel Neutron Embrittlement.

2.1.3.7.4 Anticipated Transients Without Scram

Plant modifications were implemented in response to 10 CFR 50.62 which require each pressurized water reactor to have equipment, from sensor to final actuation device, that is diverse from the reactor trip system. The Diverse SCRAM System and ATWS Mitigating System Actuating Circuitry designs fulfill the NRC requirements addressed in 10 CFR 50.62 that provides the following initiations:

1. Initiation of a reactor trip,
2. Initiation of auxiliary feedwater flow, and
3. Initiation of a turbine trip.

The equipment is required to reduce the likelihood of failure to shut down the reactor following anticipated transients and to mitigate the consequences of an ATWS event.

All ATWS equipment/components are in the scope of license renewal.

2.1.3.7.5 Station Blackout

Plant modifications and procedure changes were implemented in response to 10 CFR 50.63 to enable the station to withstand and recover from a station blackout of a specified duration. Recovery includes the ability to achieve and maintain cold shutdown.

The SSCs required for compliance with 10 CFR 50.63 were identified in a regulated event report which was used as input to the scoping and screening processes. The in-scope SSCs include the: 1) SBO diesel generator, 2) its support systems, 3) the SBO diesel generator enclosure, and 4) other equipment relied upon to mitigate an SBO event. These SSCs were installed in response to the regulation to provide an alternate on-site source of power in the event of a station blackout.

The CLB for Millstone Units 2 considers the recovery of a safety-related EDG as the method of recovery from an SBO. Based solely on the CLB, the offsite power system would not have been in the scope of license renewal. The NRC position on SBO recovery as it relates to the requirements of 10 CFR 54 (Reference 2.1-8) required the inclusion of structures and components that support the recovery of offsite power after an SBO event within the scope of license renewal. Using this guidance, the supply path required to energize the safety-related 4160 V buses from offsite power after an SBO was included in scope. For Millstone Unit 2, this required the inclusion of the off-site power feeds for the RSST up to and including the first supply breaker upstream from the RSST primary side and from the RSST secondary side to the safety-related buses. Since any of the four incoming transmission lines could be restored first, all four of the lines and associated air circuit breakers that provide power to the North Bus are within the scope of license renewal. The breaker disconnects and associated support structures are also within the scope of license renewal. Other components in-scope for offsite power restoration following a SBO include: 1) the 345 kV bus to the RSST and the associated disconnect switch, 2) the overhead conductors from the CL&P switchyard, 3) the North Bus and the associated disconnect switch, and 4) the support structures associated with these in-scope components.

2.1.3.8 DRAWINGS

The screening process for plant systems involved the review of the controlled drawings which show the system mechanical components. These drawings were marked up during the screening process to show the passive components that support one or more system intended functions. The marked up drawings were subsequently used to create a set of license renewal drawings. These drawings indicate LR system boundaries and interfaces.

2.1.3.9 OTHER DOCUMENTATION

Additional documents, such as technical reports and the Technical Specifications, were reviewed during screening to obtain clarifications of the functions performed by the SSCs.

2.1.4 SCOPING METHODOLOGY

Scoping was performed to identify the plant systems and structures within the scope of the license renewal rule. The scoping for systems and structures was performed as two separate efforts as discussed in the following sections:

2.1.4.1 SYSTEM SCOPING METHODOLOGY

System scoping was approached from the three directions discussed below. If any of the approaches indicated that a system performed one or more intended functions, the system was listed as potentially within the scope of license renewal.

1. Any system containing a component whose safety classification in PMMS met one of the scoping criteria, was presumed to be within the scope of license renewal.
2. If a system function taken from Maintenance Rule documentation, a DBS, or the SFRM was a license renewal intended function, as defined by 10 CFR 54.4, the system was presumed to be within the scope of license renewal.
3. If the 10 CFR 54.4(a)(2) Report or one of the 10 CFR 54.4(a)(3) regulated event reports indicated that a system function met 10 CFR 54.4(a)(2) or (a)(3), that system was presumed to be within the scope of license renewal.

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.

2.1.4.2 STRUCTURE SCOPING METHODOLOGY

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 (Section 2.1.3.6), or the 10 CFR 54.4(a)(3) regulated event reports (Section 2.1.3.7). In some cases, Millstone Unit 1 or Unit 3 structures provide an intended function for Millstone Unit 2. In these instances, the Millstone Unit 1 or Unit 3 structures were included in scope for Millstone Unit 2.

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 structural scoping results are presented in Section 2.2.

2.1.5 SCREENING METHODOLOGY

The initial scoping effort (Section 2.1.4) identified the plant systems and structures that were candidates for inclusion within the scope of license renewal. For each of those systems and structures, screening was performed to identify the passive components, structural members, and commodities that support an intended function. The components that are short-lived (and therefore did not require an AMR) were identified as part of the AMR process, as discussed in Section C2.3, Identification of Short-lived Components and Consumables.

Screening was divided by engineering discipline into three primary areas: (1) system (mechanical), (2) civil/structural, and (3) electrical/instrumentation and controls (I&C). The screening processes for these areas are described in Section 2.1.5.1, Section 2.1.5.3, and Section 2.1.5.4, respectively. Section 2.1.5.5 summarizes the screening review performed for stored equipment.

Selected major components were also screened to identify the passive long-lived subcomponents that require an AMR. That screening was performed as a part of the AMR process and is discussed in Section 2.1.5.2 and Appendix C, Section C2.2, Identification of In-scope Passive Subcomponents.

Screening identified NS 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 NS 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).

2.1.5.1 SYSTEM (MECHANICAL) SCREENING

Each system identified during scoping as being within the scope of license renewal was screened to identify the mechanical components (pumps, valves, piping, etc.) that support the system intended functions. The electrical/I&C components (such as heaters) that are in-scope only because they perform a system pressure boundary function, were treated as mechanical components and were also identified during system screening.

The intended functions for a system were used as input to the screening process. Those functions were developed utilizing the following reference material:

- FSAR (Section 2.1.3.1),
- Maintenance Rule Scoping Tables (Section 2.1.3.2),
- Design Basis Summaries (Section 2.1.3.3),
- Component data in the Production Maintenance Management System database (Section 2.1.3.4),
- System Functional Requirements Manual (Section 2.1.3.5),
- 10 CFR 54.4(a)(2) Report (Section 2.1.3.6),
- Five 10 CFR 54.4(a)(3) Regulated Event Reports (Section 2.1.3.7), and
- Technical review by Senior Reactor Operator licensed personnel.

The system intended functions, in conjunction with component information in PMMS, the 10 CFR 54.4(a)(2) Report, the 10 CFR 54.4(a)(3) regulated event reports, and the applicable system drawings, were used to identify the passive components within the scope of license renewal. The following guidelines were applied to this effort:

- Passive component determinations were made in accordance with 10 CFR 54.21(a)(1)(i) and the guidance in NEI 95-10 (Reference 2.1-1).
- Cascading (Reference 2.1-3) was addressed and compliance with 10 CFR 54.4(a)(2) was demonstrated by identifying support systems down to a level necessary to provide for the satisfactory accomplishment of the SR functions identified in 10 CFR 54.4(a)(1).
- Housings for active components (e.g., pump casings, valve bodies, fan and blower housings, etc.) that support the component intended function in a passive manner are subject to aging management review.
- Attendant passive components (piping, valves, etc.) of complex assemblies (such as the emergency diesel generators and air-conditioning units) are shown on the

system flow drawings and were screened separately from the complex assembly. Therefore, the attendant passive components that support a system intended function are subject to aging management review.

The LR 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. The following clarifications apply:

- A normally-open manual valve may be used as a LR boundary in those instances where a failure down stream of the valve can be quickly detected and the valve can be easily closed by operators to establish the pressure boundary.
- For the Reactor Coolant System pressure boundary and for Containment penetration isolation, the LR boundary extends to the second isolation valve when the CLB credits two valves for performing the isolation function.
- For fire protection, high-energy line break, and flooding events, the LR boundaries for a system were defined consistent with the boundaries established in the CLB evaluations. These boundaries may not always coincide with an isolation device.
- For NS fluid-containing components that are spatially oriented near SR SSCs, the boundary normally extends to:
  - A wall or floor of the area containing SR SSCs. The wall or floor is depicted on the LR drawing.
  - A NS component that is located within the area, but whose failure will not affect SR SSCs.
  - A convenient location (preferably the first valve, tank, etc.) outside the area containing SR SSCs.

Following the 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, Identification of Short-lived Components and Consumables

Certain items, such as pipe supports, panels, and cabinets, associated with a system are not typically shown on the system drawings and, therefore, were not identified on the LR drawings for each system. Instead, they were screened as structural components as explained in Section 2.1.5.3, Structural Screening.

The system screening results are presented in Section 2.3, Scoping and Screening Results: Mechanical Systems. This section addresses each system that was identified as containing in-scope mechanical components.

The following information is provided in Section 2.3 for each in-scope mechanical system:

System Description - Contains a brief description of the system, identifies the 10 CFR 54.4 criteria along with the intended functions that provide the basis for including the system in scope for license renewal, and defines the evaluation boundary for the system.

FSAR References - Identifies the FSAR sections that describe the system.

License Renewal Drawings - Lists the license renewal drawings that were developed for the system. These drawings provide system boundaries and system interfaces.

Components Subject to AMR - Identifies the screening summary table that lists the component groups that require an AMR, along with the associated intended functions. This section also identifies the aging management review results table for the system.

2.1.5.2 MAJOR COMPONENTS SCREENING

The major components within the Reactor Coolant System, i.e., the reactor vessel, the reactor vessel internals, and the steam generators, were screened separately from the remainder of the Reactor Coolant System 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, Reactor Vessel, Section 2.3.1.2, Reactor Vessel Internals, and Section 2.3.1.4, Steam Generator. The following information is provided for each of the major components:

Component Description - Contains a brief description of the major component, identifies the 10 CFR 54.4 criteria along with the intended functions that provide the basis for including the major component in scope for license renewal, and defines the evaluation boundary for the major component.

FSAR References - Identifies the FSAR sections that describe the major component.

License Renewal Drawings - Lists the license renewal drawings that were developed for the system and that indicate the major component.

Subcomponents Subject to AMR - Identifies the screening summary table that lists the subcomponents that require an AMR along with the associated intended functions. This section also identifies the aging management review results table for the major component.

2.1.5.3 STRUCTURAL SCREENING

Screening was performed for each in-scope structure identified during the scoping process. The following categories of structural equipment were not included with the associated structures during screening and were screened separately:

- Nuclear steam supply system equipment supports
- Load handling cranes and devices
- General structural supports
- Miscellaneous structural commodities

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 upon a review of the structural detail drawings.

The screening process for NSSS equipment supports was similar to structure screening. The structural members of the support that require an AMR were identified based upon a review of detailed support drawings.

Load handling cranes and devices were evaluated based upon 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, fire/EQ barrier doors, penetration fire seals, cabinets, and panels were evaluated as a commodity grouping termed Miscellaneous Structural Commodities.

The screening results are presented in Section 2.4, Scoping and Screening Results: Structures. The following information is provided for each structure and category of structural equipment:

Description - Contains a brief description of the structure, or category of structural equipment, and identifies the 10 CFR 54.4 criteria along with the intended functions that provide the basis for including the structure in scope for license renewal.

Contains a brief description of the structure, or category of structural equipment.

FSAR References - Identifies the FSAR section that describes the structure, or category of structural equipment.

Components Subject to AMR - Identifies the screening summary table that lists the structural members or commodity groups that require an AMR and the associated intended functions. This section also identifies the aging management review results table for the structure or category of structural equipment.

2.1.5.4 ELECTRICAL/I&C SCREENING

Electrical/I&C components were screened and evaluated as commodities as explained below.

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.

The following electrical/I&C component groups perform a passive function and require evaluation in an AMR:

- Cables and connectors
- Electrical penetrations
- Bus ducts

The electrical screening results are presented in Section 2.5, Scoping and Screening Results: Electrical and Instrumentation and Controls Systems. The following information is provided for each of the electrical/I&C component groups identified above.

Description - Contains a brief description of the electrical/I&C commodity group, identifies the 10 CFR 54.4 criteria along with the intended functions that provide the basis for including the electrical/I&C components in scope for license renewal, and defines the evaluation boundary for the electrical/I&C commodity group.

FSAR Reference - Identifies the FSAR section that describes the electrical/I&C commodity group.

Components Subject to AMR - Identifies the electrical/I&C commodity items that are subject to an AMR and the intended functions. This section also identifies the aging management review results table for the electrical/I&C commodity group.

2.1.5.5 SCREENING OF STORED EQUIPMENT

In response to the NRC letter of February 11, 1999 (Reference 2.1-4), a review was performed to identify equipment that: 1) is maintained in storage, 2) is reserved for installation in the plant in response to a design basis accident or regulated event, and 3) requires an AMR.

The equipment in storage that performs an intended function and is subject to aging management review includes hardware that is dedicated to the following intended functions:

1. Mitigates the effects of a fire.
2. Protects against flooding of a service water pump motor.

3. Provides temporary local valve operation in an abnormal operating event.
4. Protects against flooding of the Fire Pump Houses.
5. 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.

The stored equipment identified as requiring an AMR is listed below, along with a reference to Table 2 of the application that contains the AMR results:

Component Group	LRA Table 2 Containing the AMR Results
Protective Tank	Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation
Cables and Connectors	Table 3.6.2-1: Electrical Components - Cables and Connectors - Aging Management Evaluation
Tubing	Table 3.3.2-7: Auxiliary Systems - Instrument Air - Aging Management Evaluation
Flood Prevention Plugs	Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation
Stop Logs	Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Tools and supplies used to place the stored equipment in service are not required for the installed equipment to remain operable (once placed in service) and are outside the scope of license renewal.

Spare motors and portable fan units retained in storage were treated as active components since they are tested and maintained in accordance with the Preventive Maintenance Program.

2.1.6 DISCUSSION OF INTERIM STAFF GUIDANCE

The NRC staff has identified the following issues for which Interim Staff Guidance has been issued or is planned:

ISG-1 GALL Report Presenting One Acceptable Way to Manage Aging Effects for License Renewal

ISG-2 Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout (SBO) Rule (10 CFR Part 50.63) for License Renewal (10 CFR 54.4(a)(3))

ISG-3 Chapters II and III of GALL Report on Aging Management of Concrete Elements

ISG-4 Aging Management of Fire Protection Systems for License Renewal

ISG-5 Identification and Treatment of Electrical Fuse Holders for License Renewal

ISG-6 Identification and Treatment of Housings for Active Components for License Renewal

ISG-7 Scoping of Fire Protection Equipment for License Renewal

ISG-8 Updating the Improved License Renewal Guidance Documents - ISG Process

ISG-9 Scoping Criteria 10CFR54.4(a)(2)

ISG-10 Standardized Format for License Renewal Applications

ISG-11 Environmental Assisted Fatigue for Carbon/Low-Alloy Steel

ISG-12 One-Time Inspection of Small-Bore Piping

ISG-13 Management of Loss of Preload on Reactor Vessel Internals Bolting Using the Loose Parts Monitoring System

ISG-14 Operating Experience with Cracking in Bolting

ISG-15 Revision to Generic Aging Lessons Learned (GALL) Aging Management Program (AMP) XI.E2

ISG-16 Time-Limited Aging Analyses (TLAA) Supporting Information for License Renewal Applications

ISG-17 Periodic Inspection of Bus Ducts and Develop GALL AMP XI.E4 for Bus Ducts

ISG-18 Revision to GALL AMP XI.E3 for Inaccessible Cable

ISG-19 Revision to GALL AMP XI.M11

ISG-20 Revision to GALL AMP XI.M19

The following is a discussion of each of these issues. The ISGs that have been formalized 75 days prior to submittal of this application are addressed.

2.1.6.1 GALL REPORT PRESENTING ONE ACCEPTABLE WAY TO MANAGE AGING EFFECTS FOR LICENSE RENEWAL

NUREG-1801 was used as a reference for the determination of methods to manage aging effects.

2.1.6.2 SCOPING OF EQUIPMENT RELIED ON TO MEET THE REQUIREMENTS OF THE STATION BLACKOUT (SBO) RULE (10 CFR PART 50.63) FOR LICENSE RENEWAL (10 CFR 54.4(a)(3))

Scoping related to the station blackout regulated event of 10 CFR 54.4(a)(3) is discussed in Section 2.1.3.7.5, Station Blackout. The scoping results are consistent with ISG-2.

2.1.6.3 CHAPTERS II AND III OF GALL REPORT ON AGING MANAGEMENT OF CONCRETE ELEMENTS

The aging management reviews for in-scope concrete provide the basis that many aging effects evaluated do not require management. However, consistent with ISG-3, aging management programs have been identified for in-scope concrete. See Section 3.5, Aging Management of Containment, Structures and Component Supports, for additional information.

2.1.6.4 AGING MANAGEMENT OF FIRE PROTECTION SYSTEMS FOR LICENSE RENEWAL

Management of wall thinning due to internal corrosion (loss of material) for fire protection piping and the testing or replacement of sprinkler heads in accordance with NFPA 25 guidance have been incorporated into the Fire Protection Program.

Valve line-up inspections for halon and carbon dioxide fire suppression systems are not included in the Fire Protection Program, consistent with ISG-4.

2.1.6.5 IDENTIFICATION AND TREATMENT OF ELECTRICAL FUSE HOLDERS FOR LICENSE RENEWAL

Fuse holders (including fuse clips and fuse blocks) are considered passive electrical components. Fuse holders (including fuse clips and fuse blocks) are included in the screening process in the same manner as terminal blocks and other types of electrical connections as described in Section 2.1.5.4, Electrical/I&C Screening. Consistent with ISG-5, fuse holders that are part of a larger assembly inside the enclosure of an active component, such as switchgear, power supplies, power inverters, battery chargers, and circuit boards, are considered piece parts of the larger assembly. Since piece parts and sub-components in such an enclosure are inspected regularly and maintained as part of the normal maintenance and surveillance activities, they are considered not subject to aging management review.

ISG-5 addresses fuse holders 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. Fuse holders meeting these requirements will be evaluated prior to the period of extended operation for possible aging effects requiring management. The fuse holders will either be replaced, modified to minimize aging effects, or aging effects will be managed with the Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. This aging management program (if needed for fuse holders) will consider the aging stressors for the metallic clamps for the fuse clips, insulation material, and fuse blocks. This commitment is identified in Appendix A, Table A6.0-1, Item 6.

2.1.6.6 IDENTIFICATION AND TREATMENT OF HOUSINGS FOR ACTIVE COMPONENTS FOR LICENSE RENEWAL

The process that was used to identify passive components subject to aging management review is discussed in Section 2.1.5, Screening Methodology. Consistent with ISG-6, housings for active components that support the component intended function in a passive manner are subject to aging management review.

2.1.6.7 SCOPING OF FIRE PROTECTION EQUIPMENT FOR LICENSE RENEWAL

Scoping related to the fire protection regulated event of 10 CFR 54.4(a)(3) is discussed in Section 2.1.3.7.1, Fire Protection. The scoping results are consistent with ISG-7.

2.1.6.8 UPDATING THE IMPROVED LICENSE RENEWAL GUIDANCE DOCUMENTS - ISG PROCESS

This is a non-technical issue that has been deleted from the ISG list.

2.1.6.9 SCOPING CRITERIA 10CFR54.4(a)(2)

The process that was used to identify in-scope non-safety-related SSCs for 10 CFR 54.4(a)(2) is discussed in Section 2.1.3.6, 10 CFR 54.4(a)(2) Report. The scoping results are consistent with ISG-9.

2.1.6.10 STANDARDIZED FORMAT FOR LICENSE RENEWAL APPLICATIONS

The NEI standard license renewal application format was considered during the preparation of the LRA.

2.1.6.11 ENVIRONMENTAL ASSISTED FATIGUE FOR CARBON/LOW-ALLOY STEEL

At the time of final preparations of the LRA, this ISG has not been issued. Dominion has not applied this ISG in the development of the LRA.

2.1.6.12 ONE-TIME INSPECTION OF SMALL-BORE PIPING

Management of cracking associated with ASME Class 1 small-bore piping has been incorporated into the Inservice Inspection Program: Systems, Components and Supports. The aging management program is consistent with ISG-12.

2.1.6.13 MANAGEMENT OF LOSS OF PRELOAD ON REACTOR VESSEL INTERNALS BOLTING USING THE LOOSE PARTS MONITORING SYSTEM

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.6.14 OPERATING EXPERIENCE WITH CRACKING IN BOLTING

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.6.15 REVISION TO GENERIC AGING LESSONS LEARNED (GALL) AGING MANAGEMENT PROGRAM (AMP) XI.E2

At the time of final preparations of the LRA, a proposed ISG has been issued. Dominion has applied this ISG in the development of the LRA.

The Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits aging management program includes an enhancement that provides an alternative to the XI.E2 AMP for certain types of cables.

2.1.6.16 TIME-LIMITED AGING ANALYSES (TLAA) SUPPORTING INFORMATION FOR LICENSE RENEWAL APPLICATIONS

At the time of final preparations of the LRA, a draft of this ISG has been issued. TLAAs are discussed in Section 4.0, Time-Limited Aging Analyses. The draft ISG was considered in the development of this section of the LRA.

2.1.6.17 PERIODIC INSPECTION OF BUS DUCTS AND DEVELOP GALL AMP XI.E4 FOR BUS DUCTS

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.6.18 REVISION TO GALL AMP XI.E3 FOR INACCESSIBLE CABLE

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.6.19 REVISION TO GALL AMP XI.M11

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.6.20 REVISION TO GALL AMP XI.M19

At the time of final preparations of the LRA, this ISG was still under development by the NRC.

2.1.7 REFERENCES

2.1-1 NEI 95-10, Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule, Rev. 3, Nuclear Energy Institute, March 2001.

2.1-2 Letter of August 5, 1999 from Christopher I. Grimes of the NRC to Douglas J. Walters of NEI, Subject, "License Renewal Issue No. 98-0082, Scoping Guidance".

2.1-3 Letter of February 11, 1999 from Christopher I. Grimes of the NRC to Doug Walters of NEI, Subject: Request for Additional Information Regarding Generic License Renewal Issue No. 98-0102, "Screening of Equipment that is Kept in Storage".

2.1-4 NRC Information and Enforcement Bulletin (IEB) 79-01B, Environmental Qualification of Class 1E Equipment.

2.1-5 NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-related Electrical Equipment.

2.1-6 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, July 2001.

2.1-7 Letter of April 1, 2002 from David B. Matthews of the NRC to Alan Nelson of NEI Subject: “Staff Position on Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for License Renewal (10 CFR 54.4(a)(3))”.

2.1-8 NFPA 25, Standards for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1998 Edition, National Fire Protection Association.

2.1-9 Letter of March 10, 2003 from David B. Matthews of the NRC to Alan Nelson of NEI and David Lochbaum of the Union of Concerned Scientists, Subject: “Interim Staff Guidance (ISG) - 5 on the Identification and Treatment of Electrical Fuse Holders for License Renewal”.

2.2 PLANT LEVEL SCOPING RESULTS

Table 2.2-1 and Table 2.2-3 list the systems and the structures, respectively, that are within the scope of license renewal. A reference to the section of the application that contains the screening results is provided for each item on the list. The referenced screening results provide information regarding the specific portions of the system or structure that require an AMR. The locations of in-scope structures is shown on the following license renewal drawing:

25205-LR10025, Sh. 1

Table 2.2-2 and Table 2.2-4 list the systems and the structures, respectively, that did not meet the criteria specified in 10 CFR 54.4(a) and, therefore, were excluded from the scope of license renewal. For each item, the tables provide a reference (if applicable) to the section of the Final Safety Analysis Report that describes the system or structure.

Note that structures are identified and scoped for license renewal on a site-wide basis. Consequently, Millstone Unit 1, Unit 2, and Unit 3 specific structures, as well as non-unit specific site structures, are included in Table 2.2-3 and Table 2.2-4. However, structures that perform an intended function in support of Millstone Unit 3, and do not provide an intended function for Unit 2, are not shown on either Table 2.2-3 or Table 2.2-4. These structures are included in Table 2.2-3 of the Millstone Unit 3 LRA. The structures listed in Table 2.2-4 do not provide an intended function for either Millstone Unit 2 or Unit 3.

A listing of the abbreviations used in this section is provided in Section 1.4.

Table 2.2-1 Systems Within the Scope of License Renewal

System	Screening Results
120-Volt AC Non-Vital	See Footnote No. 1
120-Volt AC Vital	See Footnote No. 1
125-Volt DC	See Footnote No. 1
4160-Volt	See Footnote No. 1
480-Volt Load Centers	See Footnote No. 1
480-Volt Motor Control Centers	See Footnote No. 1
6900-Volt	See Footnote No. 1
Access Control Area Air Conditioning	Section 2.3.3.14, Access Control Area Air Conditioning System
Auxiliary Feedwater	Section 2.3.4.7, Auxiliary Feedwater System
Chemical and Volume Control	Section 2.3.3.11, Chemical and Volume Control System
Chilled Water	Section 2.3.3.6, Chilled Water System
Circulating Water	Section 2.3.3.1, Circulating Water System
Clean Liquid Waste Processing	Section 2.3.3.39, Clean Liquid Waste Processing System
Communications	See Footnote No. 1
Condensate	Section 2.3.4.4, Condensate System
Condensate Demin Mixed Bed	Section 2.3.4.6, Condensate Demin Mixed Bed System
Condensate Storage & Transfer	Section 2.3.4.5, Condensate Storage And Transfer System
Containment Air Recirculation and Cooling	Section 2.3.3.16, Containment Air Recirculation and Cooling System

Table 2.2-1 Systems Within the Scope of License Renewal

System	Screening Results
Containment and Enclosure Building Purge	Section 2.3.3.17, Containment and Enclosure Building Purge System
Containment Penetration Cooling	Section 2.3.3.18, Containment Penetration Cooling System
Containment Post-Accident Hydrogen Control	Section 2.3.3.19, Containment Post-Accident Hydrogen Control System
Containment Spray	Section 2.3.2.1, Containment Spray System
Control Element Drive Mechanism	Section 2.3.1.1, Reactor Vessel
Control Element Drive Mechanism Cooling	Section 2.3.3.21, Control Element Drive Mechanism Cooling System
Control Room Air Conditioning	Section 2.3.3.20, Control Room Air Conditioning System
Diesel Generator	Section 2.3.3.35, Diesel Generator System
Diesel Generator Fuel Oil	Section 2.3.3.36, Diesel Generator Fuel Oil System
Diesel Generator Ventilation	Section 2.3.3.22, Diesel Generator Ventilation System
Domestic Water	Section 2.3.3.34, Domestic Water System
Electro Hydraulic Control	See Footnote No. 1
Enclosure Building Filtration	Section 2.3.3.24, Enclosure Building Filtration System
Engineered Safety Features Actuation	See Footnote No. 1
ESF Room Air Recirculation	Section 2.3.3.23, ESF Room Air Recirculation System
Extraction Steam	Section 2.3.4.2, Extraction Steam System
Feedwater	Section 2.3.4.3, Feedwater System
Feedwater Heater Vents & Drains	Section 2.3.4.8, Feedwater Heater Vents and Drains System

Table 2.2-1 Systems Within the Scope of License Renewal

System	Screening Results
Unit 2 Fire Protection	Section 2.3.3.39, Unit 2 Fire Protection System
Unit 3 Fire Protection	Section 2.3.3.40, Unit 3 Fire Protection System
Fuel Handling Area Ventilation	Section 2.3.3.25, Fuel Handling Area Ventilation System
Gaseous Waste Processing	Section 2.3.3.40, Gaseous Waste Processing System
Hydrogen	Section 2.3.3.10, Hydrogen System
Inadequate Core Cooling Monitoring	See Footnote No. 1
In-core Instrumentation	See Footnote No. 1
Instrument Air	Section 2.3.3.7, Instrument Air System
Main Condensers Evacuation	Section 2.3.3.15, Main Condensers Evacuation System
Main Exhaust Ventilation	Section 2.3.3.26, Main Exhaust Ventilation System
Main Steam	Section 2.3.4.1, Main Steam System
Main Turbine	See Footnote No. 1
Moisture Separation & Reheat	Section 2.3.4.9, Moisture Separation and Reheat System
NI Linear Power Range Safety Channels	See Footnote No. 1
NI Wide Range Logarithmic Channels	See Footnote No. 1
Nitrogen	Section 2.3.3.8, Nitrogen System
Non-Radioactive Area Ventilation	Section 2.3.3.27, Non-Radioactive Area Ventilation System
Plant Heating & Condensate Recovery	Section 2.3.4.10, Plant Heating and Condensate Recovery System
Plant Lighting	See Footnote No. 1

Table 2.2-1 Systems Within the Scope of License Renewal

System	Screening Results
Post Accident Sampling	Section 2.3.3.41, Post Accident Sampling System
Primary Makeup Water	Section 2.3.3.13, Primary Makeup Water System
Process and Area Radiation Monitoring	Section 2.3.3.28, Process and Area Radiation Monitoring System
Radwaste Area Ventilation	Section 2.3.3.29, Radwaste Area Ventilation System
Reactor Building Closed Cooling Water	Section 2.3.3.5, Reactor Building Closed Cooling Water System
Reactor Coolant	Section 2.3.1.3, Reactor Coolant System
Reactor Protection	See Footnote No. 1
Reactor Regulating	See Footnote No. 1
Refueling Water Storage Tank and Containment Sump	Section 2.3.2.3, Refueling Water Storage Tank and Containment Sump System
Reserve Station Service Transformer	See Footnote No. 1
Safety Injection	Section 2.3.2.2, Safety Injection System
Sampling	Section 2.3.3.12, Sampling System
Screen Wash	Section 2.3.3.2, Screen Wash System
Secondary Chemical Feed	Section 2.3.4.11, Secondary Chemical Feed System
Security	Section 2.3.3.45, Security System
Service Water	Section 2.3.3.3, Service Water System
Shutdown Cooling	Section 2.3.2.4, Shutdown Cooling System
Sodium Hypochlorite	Section 2.3.3.4, Sodium Hypochlorite System
Spent Fuel Pool Cooling	Section 2.3.2.5, Spent Fuel Pool Cooling System
Station Air	Section 2.3.3.9, Station Air System

Table 2.2-1 Systems Within the Scope of License Renewal

System	Screening Results
Station Blackout Diesel Generator	Section 2.3.3.44, Station Blackout Diesel Generator System
Station Sumps and Drains	Section 2.3.3.42, Station Sumps and Drains System
Turbine Building Ventilation	Section 2.3.3.30, Turbine Building Ventilation System
Turbine Gland Sealing	Section 2.3.4.12, Turbine Gland Sealing System
Vital Switchgear Ventilation	Section 2.3.3.31, Vital Switchgear Ventilation System

1. This system does not contain any mechanical components that require an AMR. However, this system does contain electrical/I&C and/or structural components, which were evaluated on a commodity basis.

Table 2.2-2 Systems Not Within the Scope of License Renewal

System	FSAR Reference
Aerated Liquid Waste Processing	11.1.3
Auxiliary Steam Reboiler and Deaerating Feedwater	9.13.2.1 and 13.6.3
Carbon Dioxide and Hydrogen	13.6.3
Cathodic Protection	System not explicitly described in the FSAR
CEA Position Indication	7.5.3
Cond Demin 480V MCC	System not explicitly described in the FSAR
Cond Demin Aux Stm & Cond Recovery	System not explicitly described in the FSAR
Condensate Demin Liquid Waste	System not explicitly described in the FSAR
Condensate Demin Service Water	System not explicitly described in the FSAR
Condensate Demin Solid Radwaste	System not explicitly described in the FSAR
Condensate Demin Ventilation	System not explicitly described in the FSAR
Containment Auxiliary Circulation	9.9.3
CPF Component Closed Cooling	System not explicitly described in the FSAR
Exciter Air Cooler	9.7.3.2.1
Feedwater Control System	7.4.7.2.1
Generator Hydrogen Cooler	9.7.3.2.1
Intake Structure Ventilation	9.9.14
Loose Parts Monitoring	7.5.7
Main Generator	8.1.1 and 8.2.3.1
Main Transformers	8.1.1
Maintenance Shop Ventilation	9.9.14

Table 2.2-2 Systems Not Within the Scope of License Renewal

System	FSAR Reference
Normal Station Service Transformer	8.1.1
Plant Computer	7.5.5
Reactor Internal Vibration Monitor	System not explicitly described in the FSAR
Seal Oil System	10.2.2.1
Seismic Instrumentation	5.8.6
Solid Waste Processing	11.1.5
Stator Liquid Cooler	9.7.3.2.1
Turbine Building Closed Cooling Water	9.7.3
Turbine Lubricating Oil	10.2.2.1
Water Box Priming	Figure 10.4-1
Water Treatment System	9.12

Table 2.2-3 Structures Within the Scope of License Renewal

Structure	Site Map Location	Screening Results Section
345kV Switchyard	N/A	Section 2.4.2.16, 345kV Switchyard
A700 Switchgear Enclosure Dike	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Fire Pump House	124	Section 2.4.2.7, Unit 2 Fire Pump House
Unit 3 Fire Pump House	123	Section 2.4.2.8, Unit 3 Fire Pump House
Fire Water Tank 1 Foundation	121	Section 2.4.2.21, Tank Foundations
Fire Water Tank 2 Foundation	122	Section 2.4.2.21, Tank Foundations
Millstone Stack	125	Section 2.4.2.13, Millstone Stack
Retaining Wall	N/A	Section 2.4.2.15, Retaining Wall
SBO Diesel Fuel Oil Storage Tank Foundation	N/A	Section 2.4.2.21, Tank Foundations
SBO Diesel Generator Enclosure and Fuel Oil Tank Vault	328	Section 2.4.2.9, SBO Diesel Generator Enclosure and Fuel Oil Tank Vault
Sea Walls	N/A	Section 2.4.2.18, Sea Walls
Security Diesel Generator Enclosure	420	Section 2.4.2.11, Security Diesel Generator Enclosure
Stack Monitoring Equipment Building	126	Section 2.4.2.12, Stack Monitoring Equipment Building
Switchyard Control House	506	Section 2.4.2.14, Switchyard Control House
Unit 1 Control Room/Rad-Waste Treatment Building	118	Section 2.4.2.6, Unit 1 Control Room and Radwaste Treatment Building
Unit 1 Turbine Building	105	Section 2.4.2.5, Unit 1 Turbine Building
Unit 2 Auxiliary Building	204, 205	Section 2.4.2.2, Unit 2 Auxiliary Building
Unit 2 Condensate Polishing Facility and Warehouse No. 5	212	Section 2.4.2.10, Unit 2 Condensate Polishing Facility and Warehouse No. 5

Table 2.2-3 Structures Within the Scope of License Renewal

Structure	Site Map Location	Screening Results Section
Unit 2 Condensate Storage Tank Foundation and Missile Barrier	219	Section 2.4.2.21, Tank Foundations
Unit 2 Containment	207	Section 2.4.1, Containment
Unit 2 Containment Enclosure Building	207	Section 2.4.2.1, Unit 2 Containment Enclosure Building
Unit 2 Diesel Fuel Oil Storage Tank Dike	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Diesel Fuel Oil Storage Tank Foundation	227	Section 2.4.2.21, Tank Foundations
Unit 2 Discharge Structure	200	Section 2.4.2.19, Unit 2 Discharge Tunnel and Discharge Structure
Unit 2 Discharge Tunnel	N/A	Section 2.4.2.19, Unit 2 Discharge Tunnel and Discharge Structure
Unit 2 Duct Banks	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Intake Structure	202	Section 2.4.2.17, Unit 2 Intake Structure
Unit 2 Manholes	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Pipe Trenches	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Bypass Line	N/A	Section 2.4.2.20, Unit 2 Bypass Line
Unit 2 Refueling Water Storage Tank Foundation	209	Section 2.4.2.21, Tank Foundations
Unit 2 Reserve Station Service Transformer Foundation	218	Section 2.4.2.16, 345kV Switchyard
Unit 2 RWST Valve Pit	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Security Lighting Supports (Including Poles)	N/A	Section 2.4.2.22, Yard Structures
Unit 2 Transformer Firewalls and Dikes	N/A	Section 2.4.2.22, Yard Structures

Table 2.2-3 Structures Within the Scope of License Renewal

Structure	Site Map Location	Screening Results Section
Unit 2 Turbine Building	203	Section 2.4.2.4, Unit 2 Turbine Building
Unit 2 Warehouse Bldg.	206, 208	Section 2.4.2.3, Unit 2 Warehouse Building

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
6000 Gal. Above Ground Fuel Tank Foundation	484	Structure is not explicitly described in the FSAR.
Above Ground Diesel Fuel Tank Foundation	476	Structure is not explicitly described in the FSAR.
Above Ground Gasoline Tank Foundation	474	Structure is not explicitly described in the FSAR.
A-Frame	503	Structure is not explicitly described in the FSAR.
Bay Point Beach Restrooms	530	Structure is not explicitly described in the FSAR.
Block House (Electric)	423	Structure is not explicitly described in the FSAR.
Cafeteria Annex	417	Structure is not explicitly described in the FSAR.
Chemistry Safety Storage Building	457	Structure is not explicitly described in the FSAR.
Condensate Polishing Service Water Strainer House (Unit 2)	N/A	Structure is not explicitly described in the FSAR.
Dosimetry and Motor Pool Building	443	Structure is not explicitly described in the FSAR.
East Parking Security Enclosure	531	Structure is not explicitly described in the FSAR.
Emergency Operations Facility	509	Unit 2 FSAR Section 7.8.3.1.e
Engineering Office Bldg/Meter & Test Equipment Facility	511	Structure is not explicitly described in the FSAR.
Engineering Office Building	512	Structure is not explicitly described in the FSAR.
Environmental Lab	502	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Fabrication Shops	453, 454	Structure is not explicitly described in the FSAR.
Facilities Storage/Kelley Building	710	Structure is not explicitly described in the FSAR.
Fire Simulator Storage	539	Structure is not explicitly described in the FSAR.
Fire Training Simulator	538	Structure is not explicitly described in the FSAR.
Fitness Center	703	Structure is not explicitly described in the FSAR.
Fix It Now Team Building	465	Structure is not explicitly described in the FSAR.
Flammable Liquids/ Hazardous Material Building	479	Structure is not explicitly described in the FSAR.
Flammable Storage Buildings	421, 477, 481	Structure is not explicitly described in the FSAR.
Fuel Oil Storage Facility	128	Structure is not explicitly described in the FSAR.
Gas Bottle Storage Building	450	Structure is not explicitly described in the FSAR.
Gas Fire Training Pad	537	Structure is not explicitly described in the FSAR.
Hazardous Waste Processing	455	Structure is not explicitly described in the FSAR.
Hazardous Waste Storage Bldg.	543	Structure is not explicitly described in the FSAR.
Health Physics Calibration Lab in CPF	224	Structure is not explicitly described in the FSAR.
Hydrogen Recombiner Portable PCM Enclosure	657	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Incompatible Hazardous Waste Storage Bldg.	544	Structure is not explicitly described in the FSAR.
Low Level Radwaste Storage	505	Structure is not explicitly described in the FSAR.
Main Office Complex	437	Structure is not explicitly described in the FSAR.
Main Transformer – Unit 2 (Support Structure)	214	Unit 2 FSAR Section 8.1.1
Main Transformer - Unit 3 (Support Structure)	N/A	Unit 3 FSAR Section 8.1.7
Met Tower Equipment Enclosure	535	Structure is not explicitly described in the FSAR.
Meteorological Tower Training Building	540	Structure is not explicitly described in the FSAR.
Met Tower	N/A	Unit 3 FSAR Section 2.3.3
Millstone Radwaste Reduction Facility	216	Unit 2 FSAR Section 1.2.12.d
Miscellaneous Concrete Storage Pads	N/A	Structure is not explicitly described in the FSAR.
Miscellaneous Warehouses (#9, #8, #3, #4, #5, #6)	409, 428, 433, 434, 435, 516	Unit 3 FSAR Section 3.1.2.5 and FPER 5.5 Analysis 76
MRRF PCM Enclosure	461	Structure is not explicitly described in the FSAR.
Normal Station Service Transformer – (Unit 2) (Support Structure)	213	Unit 2 FSAR Section 8.1.1
Normal Station Service Transformer (Unit 3) (Support Structure)	N/A	Unit 3 FSAR Section 8.3.1.1.1

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
North Access Point	441	Structure is not explicitly described in the FSAR.
Other Miscellaneous Office Buildings, Warehouses, and Shops	N/A	Structure is not explicitly described in the FSAR.
Primary Grade Water Pump House	N/A	Unit 3 FSAR Table 3.6 - 3
Processing Center/Training	532	Structure is not explicitly described in the FSAR.
Projects Implementation Office Building	447	Structure is not explicitly described in the FSAR.
Quarry Discharge Area	N/A	Unit 2 FSAR Section 2.4.4
Quonsett Hut Building	704	Structure is not explicitly described in the FSAR.
Red Barn	500	Structure is not explicitly described in the FSAR.
Red Barn Pavilion	536	Structure is not explicitly described in the FSAR.
Refuel Outage Building	410	Structure is not explicitly described in the FSAR.
Sandblasting Facility	329	Structure is not explicitly described in the FSAR.
Schoolhouse	504	Structure is not explicitly described in the FSAR.
Security Alarm Station	201	Structure is not explicitly described in the FSAR.
Security Operations Center	405	Unit 3 FSAR Section 9.5.2.2.1
Simulator Building	508	Structure is not explicitly described in the FSAR.
Site Facilities Contractor Building	458	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Site Facilities Trash Recycling Building	637	Structure is not explicitly described in the FSAR.
Site Robotics & TV	223	Structure is not explicitly described in the FSAR.
Unit 2 Sodium Hypochlorite Building	221	Unit 2 FSAR Section 5.6.1
South Access Point	452	Structure is not explicitly described in the FSAR.
Spare Transformer (Support Structure)	482	Structure is not explicitly described in the FSAR.
Steel Transmission Towers	N/A	Structure is not explicitly described in the FSAR.
Sub Station #3	449	Structure is not explicitly described in the FSAR.
Sub Station #5	525	Structure is not explicitly described in the FSAR.
Sub Station #8	524	Structure is not explicitly described in the FSAR.
Sub Station #9	425	Structure is not explicitly described in the FSAR.
Switchyard Storage Building	529	Structure is not explicitly described in the FSAR.
Telecommunications Radio Housing	127	Unit 2 FSAR Section 7.8.3.1.e
Trailer Utility Enclosure	483	Structure is not explicitly described in the FSAR.
Training Building	507	Structure is not explicitly described in the FSAR.
Unit 1 and 2 OPS Office	110	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Unit 1 Condensate Pump House	113	Structure is not explicitly described in the FSAR.
Unit 1 Condensate Storage Tank Foundation	114	Structure is not explicitly described in the FSAR.
Unit 1 Demineralized Water Storage Tank Foundation	112	Unit 2 FSAR Table 9.12 - 1
Unit 1 Discharge Structure	102	Structure is not explicitly described in the FSAR.
Unit 1 Fuel Farm	401	Structure is not explicitly described in the FSAR.
Unit 1 Gas Recombiner Room	109	Structure is not explicitly described in the FSAR.
Unit 1 Gas Turbine	100	Structure is not explicitly described in the FSAR.
Unit 1 Hypochlorite System Room	108	Structure is not explicitly described in the FSAR.
Unit 1 Intake Structure	107	Structure is not explicitly described in the FSAR.
Unit 1 Maintenance Shop	103	Structure is not explicitly described in the FSAR.
Unit 1 Radwaste Truck Bay	120	Structure is not explicitly described in the FSAR.
Unit 1 Reactor Building	111	Structure is not explicitly described in the FSAR.
Unit 1 Solid Radwaste Building	119	Structure is not explicitly described in the FSAR.
Unit 1 Strainer Pit	106	Structure is not explicitly described in the FSAR.
Unit 1 Switchyard	104	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Unit 1 Waste Surge Tank Foundation	115	Structure is not explicitly described in the FSAR.
Unit 1 Xenon-Krypton Building	116	Structure is not explicitly described in the FSAR.
Unit 2 Condensate Surge Tank Foundation	217	Unit 2 FSAR Section 2.7.5.1
Unit 2 Hydrogen Cylinder Storage Area	226	Structure is not explicitly described in the FSAR.
Unit 2 Maintenance Annex	419	Structure is not explicitly described in the FSAR.
Unit 2 Maintenance Gas Bottle Storage	225	Structure is not explicitly described in the FSAR.
Unit 2 Maintenance Shop	211	Structure is not explicitly described in the FSAR.
Unit 2 Maintenance Snubber Shop	416	Structure is not explicitly described in the FSAR.
Unit 2 Primary Water Storage Tank Foundation	210	Unit 2 FSAR Table 9.12 - 1
Unit 2 Service Water Pump Strainer House Structure	222	Structure is not explicitly described in the FSAR.
Unit 2 Water Treatment Facility	215	Structure is not explicitly described in the FSAR.
Unit 3 Auxiliary Building PCM Enclosure	463	Structure is not explicitly described in the FSAR.
Unit 3 Boron Test Tanks Foundation	N/A	Unit 3 FSAR Section 9.3.5.2
Unit 3 Condensate Surge Tank Foundation	304	Structure is not explicitly described in the FSAR.
Unit 3 Domestic Water Storage Tank Foundation	N/A	Structure is not explicitly described in the FSAR.

Table 2.2-4 Structures Not Within the Scope of License Renewal

Structure	Site Map Location	FSAR Reference
Unit 3 Groundwater Underdrains Storage Tank Foundation	N/A	Structure is not explicitly described in the FSAR.
Unit 3 Liquid Nitrogen Storage Tank Foundation	N/A	Unit 3 FSAR Section 9.2.8.2
Unit 3 Maintenance Bottled Gas Storage Building	327	Structure is not explicitly described in the FSAR.
Unit 3 PGST A and B Nitrogen Storage Tank Foundation	N/A	Structure is not explicitly described in the FSAR.
Unit 3 Primary Grade Water Storage Tank Foundation	314	Unit 3 FSAR Section 9.2.8.3
Unit 3 Waste Test Tanks Foundation	N/A	Unit 3 FSAR Section 11.2.2.1
Unit 3 Water Treatment Storage Tank Foundation	306	Structure is not explicitly described in the FSAR.
Unit 3 Yard Vacuum Priming Tank Foundation	N/A	Unit 3 FSAR, FPER 5.5 Analysis 86
Vehicle Access Point Rain Shelter	468	Structure is not explicitly described in the FSAR.
Vehicle Access Point Security Enclosure	533	Structure is not explicitly described in the FSAR.
Vehicle Rad Monitor	542	Structure is not explicitly described in the FSAR.

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

A listing of the abbreviations used in this section is provided in Section 1.4.

2.3.1 REACTOR COOLANT SYSTEM

Section 2.3.1 provides a description of the Reactor Coolant System and major Reactor Coolant System components as indicated below:

- Reactor vessel (Section 2.3.1.1)
- Reactor vessel internals (Section 2.3.1.2)
- Reactor Coolant System (Section 2.3.1.3)
- Steam generator (Section 2.3.1.4)

2.3.1.1 REACTOR VESSEL

Component Description

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 shell (upper, intermediate, and lower) is constructed of steel plates welded together both circumferentially and longitudinally. The reactor vessel is vertically mounted on welded support pads attached to the bottom side of three of the six primary nozzles that are spaced circumferentially around the upper shell just below the vessel flange. The reactor vessel flange is a forged ring with a machined ledge (core support ledge) on the inside surface, which supports the entire weight of the reactor vessel internals and core. The reactor vessel internals and core hang from the core support ledge and are provided with lateral support by core stabilizer lugs. The hot-leg and cold-leg Reactor Coolant System loop piping attaches to the safe ends of the primary nozzles. The two-loop configuration has four coolant inlet nozzles and two coolant outlet nozzles. The internal surfaces of the reactor vessel in contact with the coolant are clad, which provides increased corrosion resistance.

The reactor vessel flange mates with the closure head flange. Closure studs are threaded into the reactor vessel flange. Nuts and spherical washers hold the closure head in place on the studs. Two self-energizing O-ring gaskets prevent leakage of reactor coolant between the mating surfaces of the reactor closure head flange and the reactor vessel flange. A dynamic seal is formed by the compression of the O-rings and by the reactor vessel's internal pressure.

The closure head dome is penetrated by control element drive mechanism nozzles, instrument tubes, and one vent line (head vent pipe).

Vessel support pads located below the primary nozzles provide for support of the reactor vessel. The weight of the reactor vessel is transmitted through the reactor vessel support pads to the concrete biological shield wall that surrounds the reactor vessel.

The reactor vessel is in the scope of license renewal because it meets 10CFR54.4(a)(1). The reactor vessel directly maintains the Reactor Coolant System pressure boundary and supports and contains the reactor core and core support structures. Additionally, the reactor vessel meets 10CFR54.4(a)(3) by providing a function that supports pressurized thermal shock.

The evaluation boundary for the reactor vessel encompasses the reactor vessel pressure boundary subcomponents, which includes the shell, top and bottom heads, closure head stud assembly, primary nozzles and safe ends, penetrations, and CEDM housings. Other subcomponents included that support the intended functions of the reactor vessel are the flow skirt and flow baffle, surveillance capsule holders, and core stabilizing and core stop lugs.

FSAR Reference

Additional details of the reactor vessel are provided in FSAR, Sections 3.3.3.2, 4.3.1, Tables 4.3 - 1, 4.5 - 1, 4.5 - 2, and 4.6 - 1 through 4.6 - 13.

License Renewal Drawings

The license renewal drawings for the reactor vessel are listed below:

25203-LR26014, Sh. 1
25203-LR26023, Sh. 1

Subcomponents Subject to Aging Management Review

The subcomponents of the reactor vessel that require aging management review are indicated in Table 2.3.1-1, Reactor Vessel.

The aging management review results for these subcomponents are provided in Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation.

2.3.1.2 REACTOR VESSEL INTERNALS

Component Description

The reactor vessel internals are designed to support and orient the reactor core fuel assemblies and control element assemblies, absorb the 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 components of the reactor vessel internals are divided into six parts consisting of the upper guide structure, CEA shroud assemblies, core support barrel assembly, core shroud assembly, lower internals assembly, and in-core instrumentation system.

The upper guide structure assembly is located above the reactor core within the core support barrel. The upper end of the assembly is flanged and rests on the core support barrel. The subcomponents comprising the upper guide structure include the upper guide structure support plate, fuel assembly alignment plate, fuel alignment plate guide lugs and guide lug inserts, and expansion compensating ring.

The CEA shroud assemblies consist of the CEA shrouds, the CEA shroud bolts, and the CEA shroud extension shaft guides. The CEA shroud assemblies are located within the upper guide structure, and extend to an elevation above the upper guide structure support plate. The CEA shrouds guide the control rods into and out of the reactor core.

The core support barrel assembly consists of the core support barrel, the core support barrel upper flange, the core support barrel alignment keys, and the core support barrel snubbers. The core support barrel is cylindrically shaped and contains the core and other internals.

The core shroud assembly is located within the core support barrel and below the upper guide structure. The core shroud assembly, which is attached to the core support plate by tie rods, provides a boundary for the coolant flow and limits the amount of coolant bypass flow.

The lower internals assembly positions and provides axial support for the core and consists of the core support plate, fuel alignment pins, and lower support structure beam assemblies. The lower support structure beam assemblies allow core support plate loads to be transferred to the core support barrel.

The ICI system consists of the ICI assemblies and an ICI support assembly. The ICI support assembly consists of an ICI support plate that supports and aligns the ICI assemblies within the upper guide structure.

The reactor vessel internals are in the scope of license renewal because they meet 10CFR54.4(a)(1). The reactor vessel internals support the reactor core in a coolable geometry and provides a CEA insertion path.

The evaluation boundary of the reactor vessel internals consists of subcomponents that provide structural support and flow distribution, including the upper guide structure, CEA guide assemblies, core support barrel assembly, core shroud assembly, lower internals assembly, and the ICI subcomponents.

FSAR Reference

Additional details of the reactor vessel internals are provided in FSAR Sections 3.3.2 and 7.5.4. FSAR Figure 3.3-9, Figure 3.3-10, Figure 3.3-11 Figure 3.3-12, Figure 3.3-13, and Figure 3.3-14

License Renewal Drawings

None

Subcomponents Subject to Aging Management Review

The subcomponents of the reactor vessel internals that require aging management review are indicated in Table 2.3.1-2, Reactor Vessel Internals.

The aging management review results for these subcomponents are provided in Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation.

2.3.1.3 REACTOR COOLANT SYSTEM

System Description

The Reactor Coolant System 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 Reactor Coolant System provides a pressure boundary for containing the primary coolant, serves to confine radioactive material, and limits the uncontrolled release of radioactive material.

The Reactor Coolant System consists of two loops connected at the reactor vessel. Each loop contains two reactor coolant pumps, one steam generator, and interconnecting piping. A pressurizer connected to Loop 1 provides a means for controlling Reactor Coolant System pressure. In addition, the Reactor Coolant System contains piping that allows venting of the reactor vessel and pressurizer.

During operation, the heat capacity of the Reactor Coolant System attenuates thermal transients. The Reactor Coolant System accommodates coolant volume changes during normal operation and during anticipated transient conditions. The layout of the system ensures natural circulation capability following a loss-of-flow incident to permit cooldown without overheating the core.

The reactor coolant pumps are vertical single-stage centrifugal pumps. The reactor coolant pump casing, cover (including the thermal barrier), inner tubes of the seal cooler, closure bolting, and driver mount are considered part of the Reactor Coolant System pressure boundary. The upper and lower RCP motor lube oil coolers and the outer tubes of the seal cooler provide a Reactor Building Closed Cooling Water System pressure boundary.

The pressurizer is a vertically oriented cylindrical vessel connected to the Reactor Coolant System hot-leg via the surge line piping and to the cold-leg via the spray line. The pressurizer consists of a shell section and an upper and lower head. Pressurizer nozzles are provided for various connections (e.g., relief valves, safety valves, spray line, and surge line). The pressurizer is supported by seismic support lugs and a support skirt that is welded to the lower head.

The Reactor Coolant System is in the scope of license renewal because it meets 10CFR54.4(a)(1). The safety-related intended functions of the Reactor Coolant System 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 1.97 safety-related indication, 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 Reactor Coolant System meets 10CFR54.4(a)(2) because the system contains non-safety-related components credited for mitigating a high-energy line break and non-safety-related components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related system, structure or component. The Reactor Coolant System also meets 10CFR54.4(a)(3) because it contains EQ components and supports fire protection, station blackout, and pressurized thermal shock.

The evaluation boundary for the Reactor Coolant System includes the welds, piping, and components from the reactor pressure vessel nozzle to the steam generator inlet nozzle (not including the safe ends), and from the steam generator outlet nozzle (not including the safe ends) through the reactor coolant pump to the reactor vessel inlet nozzle. Also included are the pressurizer surge line, the pressurizer (including integral support components), and the RCP motor lube oil coolers.

FSAR Reference

Additional details of the Reactor Coolant System can be found in the FSAR, Chapter 4, Figure 4.1-1, Figure 4.1-2, Figure 4.1-3 and Figure 4.3-7.

License Renewal Drawings

The license renewal drawings for the Reactor Coolant System are listed below:

25203-LR26002, Sh. 1
25203-LR26002, Sh. 2
25203-LR26005, Sh. 2
25203-LR26014, Sh. 1
25203-LR26014, Sh. 2
25203-LR26014, Sh. 3
25203-LR26015, Sh. 3
25203-LR26017, Sh. 1
25203-LR26017, Sh. 2
25203-LR26020, Sh. 5
25203-LR26022, Sh. 4
25203-LR26023, Sh. 1
25203-LR26024, Sh. 1

Components Subject to AMR

The component types that require aging management review are indicated in Table 2.3.1-3, Reactor Coolant.

The aging management review results for these components are provided in Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation.

2.3.1.4 STEAM GENERATOR

Component Description

The NSSS utilizes two steam generators to transfer the heat generated in the Reactor Coolant System to the secondary system and produce steam at the warranted steam pressure and quality.

The lower portions of the Unit 2 steam generators were replaced with Babcock and Wilcox - Canada replacement steam generators of the same form, fit and function as the original steam generators. Although similar in general design concept and capacity, the Unit 2 replacement steam generators utilize materials that have improved resistance to known corrosion issues affecting pressurized water reactor steam generators.

Each steam generator is a vertical shell and U-tube heat exchanger, where heat transferred from a single-phase fluid at high temperature and pressure (the reactor coolant) on the tube side is used to generate a two-phase (steam-water) mixture at a lower temperature and pressure on the secondary side. The reactor coolant coming from the reactor vessel enters the steam generator through a single nozzle into the primary channel head, flows through the inverted U-tubes, and exits through two nozzles in the primary channel head to the reactor coolant pumps. The head is divided into inlet and outlet chambers by a vertical divider plate. The steam-water mixture, generated in the secondary side, flows upward through the moisture separators to the steam outlet nozzle at the top of the vessel, providing essentially dry, saturated steam.

Manways are provided to permit access to both sides of the steam generator primary heads and to the moisture separating equipment on the secondary side of the steam generators. The secondary side of the steam generators also contains the tube supports, tube bundle wrapper (shroud), feedwater nozzle and distribution system, and moisture separation system.

The steam generator is in the scope of license renewal and meets 10 CFR 54.4(a)(1). The steam generator directly maintains the Reactor Coolant System 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 meets 10CFR54.4(a)(3) because it provides for core heat removal in support of station blackout and fire protection.

The evaluation boundary of the steam generator encompasses the steam generator pressure boundary subcomponents, which includes the shell, nozzles and safe ends, manway covers and bolting, tubesheet, tubes, and tube plugs. Also included are the support subcomponents for the tube bundle and steam generator, which includes the tube support lattice bars, tube support lattice support ring, shroud, base support and flange, and support brackets and lugs. Other subcomponents included that support the intended function of the steam generator are the feedwater inlet ring, divider plate, feedwater nozzle thermal sleeve, and steam nozzle flow restrictor.

FSAR Reference

Additional steam generator details are provided in the FSAR, Section 4.3.2 and Figure 4.3-2.

License Renewal Drawings

The license renewal drawings for the steam generator are listed below:

25203-LR26002, Sh. 1
25203-LR26002, Sh. 2
25203-LR26005, Sh. 2

Subcomponents Subject to Aging Management Review

The subcomponents of the steam generator that require aging management review are indicated in Table 2.3.1-4, Steam Generator.

The aging management review results for these subcomponents are provided in Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation.

Screening Results Tables: Reactor Coolant System

See Table 2.0-1 for definition of intended function.

Table 2.3.1-1 Reactor Vessel

Subcomponent	Intended Function(s)
Bottom Head	Pressure Boundary, Structural Support
CEDM Head Penetration Nozzle	Pressure Boundary, Structural Support
CEDM Head Penetration Nozzle Flange	Pressure Boundary, Structural Support
CEDM Pressure Housings	Pressure Boundary, Structural Support
Closure Head Dome	Pressure Boundary, Structural Support
Closure Head Flange	Pressure Boundary, Structural Support
Closure Head Lifting Lugs	Structural Support
Closure Head Stud Assembly	Pressure Boundary
Core Stabilizing Lugs and Core Stop Lugs	Structural Support
Flow Skirt, Flow Baffle	Flow Distribution
Head Vent Pipe	Pressure Boundary
Instrument Tube Flange and Studs/Nuts/ Washers	Pressure Boundary, Structural Support
Instrument Tubes	Pressure Boundary, Structural Support
Intermediate and Lower Shell	Pressure Boundary
Primary Nozzle and Safe End	Pressure Boundary, Structural Support
Surveillance Capsule Holders	Structural Support
Upper Shell	Pressure Boundary
Vessel Flange and Core Support Ledge	Pressure Boundary, Structural Support

See Table 2.0-1 for definition of intended function.

Table 2.3.1-2 Reactor Vessel Internals

Subcomponent	Intended Function(s)
CEA Shroud Bolts	Structural Support
CEA Shroud Extension Shaft Guides	Structural Support
CEA Shrouds - Dual	Flow Distribution, Structural Support
CEA Shrouds - Single	Flow Distribution, Structural Support
Core Shroud Assembly	Flow Distribution, Structural Support
Core Shroud Tie Rods	Structural Support
Core Support Barrel	Flow Distribution, Structural Support
Core Support Barrel Alignment Keys	Structural Support
Core Support Barrel Snubber Assemblies	Structural Support
Core Support Barrel Upper Flange	Structural Support
Core Support Columns	Structural Support
Core Support Plate	Structural Support
Expansion Compensating Ring	Structural Support
Fuel Alignment Pins	Structural Support
Fuel Alignment Plate	Flow Distribution, Structural Support
Fuel Alignment Plate Guide Lugs and Guide Lug Inserts	Structural Support
ICI Support Plate and Guide Tubes	Structural Support
Lower Support Structure Beam Assemblies	Structural Support
Upper Guide Structure Support Plate	Flow Distribution, Structural Support

See Table 2.0-1 for definition of intended function.

Table 2.3.1-3 Reactor Coolant

Component Type	Intended Function(s)
Bolting	Limited Structural Integrity, Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Pipe	Limited Structural Integrity, Pressure Boundary
Pressurizer	Pressure Boundary, Spray Pattern, Structural Support
Pressurizer Heaters	Pressure Boundary
Quench Tank	Limited Structural Integrity, Pressure Boundary
RCP Motor Lower Lube Oil Coolers	Pressure Boundary
RCP Seal Coolers	Pressure Boundary
RCP Thermal Barriers	Pressure Boundary
RCP Motor Upper Lube Oil Coolers	Pressure Boundary
Reactor Coolant Pumps	Pressure Boundary
Rupture Disks	Limited Structural Integrity, Pressure Boundary
Thermal Sleeves	Limit Thermal Cycling
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.1-4 Steam Generator

Subcomponent	Intended Function(s)
Base Support and Flange; Support Brackets and Lugs	Structural Support
Divider Plate	Flow Distribution
Feedwater Inlet Ring and Support	Structural Support
Feedwater Nozzle and Safe End	Pressure Boundary
Feedwater Nozzle Thermal Sleeve	Limit Thermal Cycling
Lower Head	Pressure Boundary
Nozzle Dams and Holddown Rings	Pressure Boundary
Primary Instrument Nozzles	Pressure Boundary
Primary Manway Bolting	Pressure Boundary
Primary Manway Cover and Diaphragm	Pressure Boundary
Primary Nozzle and Safe End	Pressure Boundary
Secondary Manway and Handhole Bolting	Pressure Boundary
Secondary Manway and Handhole Covers	Pressure Boundary
Secondary Side Nozzles (Except Steam and Feedwater)	Pressure Boundary
Shroud	Flow Distribution, Structural Support
Steam Nozzle and Safe End	Pressure Boundary
Steam Nozzle Flow Restrictor	Restricts Flow
Top Head	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.1-4 Steam Generator

Subcomponent	Intended Function(s)
Transition Cone	Pressure Boundary
Tube Plugs	Pressure Boundary
Tube Support Lattice Bars	Structural Support
Tube Support Lattice Support Rings	Structural Support
Tubes	Pressure Boundary
Tubesheet	Pressure Boundary
Upper and Lower Shell	Pressure Boundary

See Table 2.0-1 for definition of intended function.

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

2.3.2.1 CONTAINMENT SPRAY SYSTEM

System Description

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 initially pumps borated water from the RWST through the spray nozzles in the Containment. When the RWST empties, the Containment spray pumps suction is automatically transferred to the Containment sump. The recirculated sump water is cooled by the shutdown cooling heat exchangers prior to discharge into the Containment through the spray nozzles. The spray nozzles direct cooled, borated water spray downward from the upper regions of the Containment to cool and depressurize the Containment.

The Containment Spray System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing heat removal from Containment, Regulatory Guide 1.97 safety-related indications, and Containment pressure boundary integrity. The Containment Spray System also meets 10CFR54.4(a)(3) because it contains EQ components and supports fire protection.

The evaluation boundary of the Containment Spray System includes components from the outlet of the RWST and Containment sump through the system pumps, valves, heat exchangers, and piping to the spray nozzles.

FSAR References

Additional details of the Containment Spray System can be found in the FSAR, Section 6.4.

License Renewal Drawings

The license renewal drawings for the Containment Spray System are listed below:

25203-LR26015, Sh. 1
25203-LR26015, Sh. 2
25203-LR26015, Sh. 3
25203-LR26022, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.2-1 Containment Spray.

The aging management review results for these components are provided inTable 3.2.2-1: Engineered Safety Features - Containment Spray - Aging Management Evaluation.

2.3.2.2 SAFETY INJECTION SYSTEM

System Description

The purpose of the Safety Injection System is to provide a source of borated water to the Reactor Coolant System 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.

In the event of a LOCA or MSLB, the safety injection pumps start automatically to inject water from the RWST to the Reactor Coolant System. When the RWST empties, the low-pressure safety injection pumps automatically shutdown and the high-pressure safety injection pumps suction is automatically transferred to the Containment sump for the recirculation phase of the accident. The nitrogen pre-charged safety injection tanks discharge through check valves into the Reactor Coolant System for a large-break LOCA.

The low-pressure safety injection pumps also function to remove heat from the Reactor Coolant System during plant shutdown as described in Section 2.3.2.4, Shutdown Cooling System.

The Safety Injection System is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing injection of borated water into the Reactor Coolant System following an accident, control of reactor core boron precipitation during long-term LOCA recovery, reactor decay heat removal during shutdown conditions, RWST isolation, Reactor Coolant System pressure boundary integrity, Containment pressure boundary integrity, and Regulatory Guide 1.97 safety-related indication. The Safety Injection System meets 10 CFR 54.4(a)(2) because the system contains non-safety-related components credited for mitigating the effects of a high-energy line break. The Safety Injection System also meets 10 CFR 54.4(a)(3) because it contains EQ components and supports fire protection and station blackout.

The evaluation boundary of the Safety Injection System extends from the RWST and the Containment sump, through the safety injection pumps, and into the Reactor Coolant

System. The boundary also includes the safety injection tanks and associated piping and valves to the Reactor Coolant System.

FSAR References

Additional details of the Safety Injection System can be found in the FSAR, Section 6.3.

License Renewal Drawings

The license renewal drawings for the Safety Injection System are listed below:

25203-LR26014, Sh. 2
25203-LR26015, Sh. 1
25203-LR26015, Sh. 2
25203-LR26015, Sh. 3
25203-LR26017, Sh. 1
25203-LR26020, Sh. 5
25203-LR26022, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.2-2 Safety Injection.

The aging management review results for these components are provided in Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation.

2.3.2.3 REFUELING WATER STORAGE TANK AND CONTAINMENT SUMP SYSTEM

System Description

The 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.

The RWST and Containment Sump System is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing a source of water to the safety injection and Containment spray pumps, sump water pH control, Regulatory Guide 1.97

safety-related indication, and Containment pressure boundary integrity. The system also supports Reactor Coolant System inventory and reactivity control, decay heat removal make-up, and spent fuel pool inventory control during shutdown conditions. The RWST and Containment Sump System meets 10 CFR 54.4(a)(2) because the system contains non-safety-related components credited for mitigating the effects of a high-energy line break. The RWST and Containment Sump System also meets 10 CFR 54.4(a)(3) because it contains EQ components and supports fire protection and station blackout.

The evaluation boundary extends from the RWST and Containment sump to the suction piping of the Containment spray and safety injection system pumps.

FSAR References

Additional details of the RWST and Containment Sump System can be found in the FSAR, Section 6.2.

License Renewal Drawings

The license renewal drawings for the RWST and Containment Sump System are listed below:

25203-LR26015, Sh.1
25203-LR26015, Sh.2
25203-LR26017, Sh.3
25203-LR26023, Sh.2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.2-3 Refueling Water Storage Tank and Containment Sump.

The aging management review results for these components are provided in Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation.

2.3.2.4 SHUTDOWN COOLING SYSTEM

System Description

The Shutdown Cooling System transfers heat from the Reactor Coolant System 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.

The Shutdown Cooling System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing heat removal from recirculated Containment sump water following a LOCA, a flow path for reactor core boron precipitation control during long-term accident recovery, heat removal from the Reactor Coolant System for plant cooldown, supplementary heat removal from the spent fuel pool, Regulatory Guide 1.97 safety-related indication, Reactor Coolant System pressure boundary integrity, and Containment pressure boundary integrity. The Shutdown Cooling System also meets 10CFR54.4(a)(3) because it contains EQ components and supports fire protection and station blackout.

The evaluation boundary includes the entire the Shutdown Cooling System.

FSAR References

Additional details of the Shutdown Cooling System can be found in the FSAR, Section 9.3.

License Renewal Drawings

The license renewal drawings for the Shutdown Cooling System are listed below:

25203-LR26015, Sh. 1
25203-LR26015, Sh. 2
25203-LR26015, Sh. 3
25203-LR26017, Sh. 2
25203-LR26022, Sh. 2
25203-LR26023, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.2-4 Shutdown Cooling.

The aging management review results for these components are provided in Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation.

2.3.2.5 SPENT FUEL POOL COOLING SYSTEM

System Description

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 is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing 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.

FSAR References

Additional details of the Spent Fuel Pool Cooling System can be found in the FSAR, Section 9.5.

License Renewal Drawings

The license renewal drawings for the Spent Fuel Pool Cooling System are listed below:

25203-LR26015, Sh. 1
25203-LR26022, Sh. 2
25203-LR26023, Sh. 1
25203-LR26023, Sh. 2
25203-LR26024, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.2-5 Spent Fuel Pool Cooling.

The aging management review results for these components are provided in Table 3.2.2-5: Engineered Safety Features - Spent Fuel Pool Cooling - Aging Management Evaluation.

Screening Results Tables: Engineered Safety Features Systems

See Table 2.0-1 for definition of intended function.

Table 2.3.2-1 Containment Spray

Component Type	Intended Function(s)
Bolting	Pressure Boundary
CS Pump Seal Coolers	Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Spray Nozzles	Spray Pattern
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.2-2 Safety Injection

Component Type	Intended Function(s)
Bolting	Pressure Boundary
Flow Elements	Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
HPSI Pump Seal Coolers	Pressure Boundary
LPSI Pump Seal Coolers	Pressure Boundary
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Safety Injection Tanks	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.2-3 Refueling Water Storage Tank and Containment Sump

Component Type	Intended Function(s)
Bolting	Pressure Boundary
Encapsulation Piping	Pressure Boundary
Encapsulation Valves	Pressure Boundary
Expansion Joints	Pressure Boundary
Pipe	Pressure Boundary
Refueling Water Storage Tank	Pressure Boundary
Rupture Disks	Pressure Boundary
TSP Baskets	Structural and/or functional support
Tubing	Pressure Boundary
Valves	Pressure Boundary
Vortex Breakers	Vortex Suppression

See Table 2.0-1 for definition of intended function.

Table 2.3.2-4 Shutdown Cooling

Component Type	Intended Function(s)
Bolting	Pressure Boundary
Carry-Over Tank	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flexible Hoses	Pressure Boundary
Flow Elements	Pressure Boundary
Pipe	Pressure Boundary
Restricting Orifices	Pressure Boundary, Restricts Flow
Shutdown Cooling Heat Exchangers	Pressure Boundary
Tubing	Pressure Boundary
Vacuum Flask	Pressure Boundary
Vacuum Pump	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.2-5 Spent Fuel Pool Cooling

Component Type	Intended Function(s)
Bolting	Pressure Boundary
Expansion Joints	Pressure Boundary
Flow Elements	Pressure Boundary
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Spent Fuel Pool Heat Exchangers	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

2.3.3 AUXILIARY SYSTEMS

2.3.3.1 CIRCULATING WATER SYSTEM

System Description

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 is in the scope of license renewal and meets 10CFR54.4(a)(2) because the 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 shutdown the circulating water pumps to prevent flooding in the Turbine Building. The system also contains non-safety-related 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 evaluation boundary includes the warm water bypass line components and the non-safety-related Circulating Water System piping and valves in the Intake Structure that are spatially oriented near a safety-related SSC. The level switches are active components and are not subject to aging management review.

FSAR Reference

Additional details of the Circulating Water System can be found in the FSAR, Sections 9.7.1.

License Renewal Drawings

The license renewal drawing for the Circulating Water System is listed below:

25203-LR26008, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-1, Circulating Water.

The aging management review results for these components are provided in Table 3.3.2-1: Auxiliary Systems - Circulating Water - Aging Management Evaluation.

2.3.3.2 SCREEN WASH SYSTEM

System Description

The Screen Wash System provides a source of water to clear debris from the travelling water screens at the Intake Structure. The system is comprised of two screen wash pumps, strainers, piping, and valves.

The Screen Wash System is in the scope of license renewal and meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 evaluation boundary includes the non-safety-related Screen Wash System components in the Intake Structure that are spatially oriented near a safety-related SSC.

FSAR Reference

Additional details of the Screen Wash System can be found in the FSAR, Section 9.7.1.

License Renewal Drawings

The license renewal drawing for the Screen Wash System is listed below:

25203-LR26008, Sh. 4

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-2, Screen Wash.

The aging management review results for these components are provided in Table 3.3.2-2: Auxiliary Systems - Screen Wash - Aging Management Evaluation.

2.3.3.3 SERVICE WATER SYSTEM

System Description

The purpose of the Service Water System is to provide a dependable flow of cooling water to the following safety-related and non-safety-related 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 system also provides a source of water for the injection of sodium hypochlorite into the Circulating Water System and lubrication water for the circulating water pump bearings.

Three service water pumps (one is an installed spare) take suction on the Long Island Sound and discharge into two independent service water supply headers. A motor-driven strainer is provided on the discharge side of each service water pump. Supply headers are redundant and independent such that only one header is required under accident conditions.

Non-safety-related heat loads are automatically isolated on a safety signal such that service water flow is directed to safety-related loads in the event of an accident.

The Service Water System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing cooling water flow to safety-related heat loads to transfer rejected heat to the ultimate heat sink and isolation of non-safety-related heat loads in the event of a design basis accident. The Service Water System meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 nonsafety-related components credited for mitigating a high energy line break accident. The Service Water System meets 10CFR54.4(a)(3) because the system includes EQ equipment and supports fire protection and station blackout.

The evaluation boundary includes the piping and components from the service water pumps, through the safety-related heat loads, to the discharge canal. Also included in the evaluation boundary are non-safety-related components located in the Turbine Building, Auxiliary Building, and Intake Structure with a spatial orientation near a safety-related SSC and components that are required to provide isolation of non-safety-related portions of the system.

FSAR Reference

Additional details of the Service Water System can be found in the 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

License Renewal Drawings

The license renewal drawings for the Service Water System are listed below:

25203-LR26008, Sh. 1
25203-LR26008, Sh. 2
25203-LR26008, Sh. 3
25203-LR26008, Sh. 4

25203-LR26011, Sh. 2
25203-LR26018, Sh. 2
25203-LR26018, Sh. 3
25203-LR26022, Sh. 1
25203-LR26027, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-3, Service Water.

The aging management review results for these components are provided inTable 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation.

2.3.3.4 SODIUM HYPOCHLORITE SYSTEM

System Description

The Sodium Hypochlorite System provides a source of sodium hypochlorite to minimize marine growth in the Service Water System and the Circulating Water System.

The Sodium Hypochlorite System is in the scope of license renewal and meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 evaluation boundary includes the non-safety-related Sodium Hypochlorite System piping and valves in the Intake Structure that are spatially oriented near a safety-related SSC.

FSAR Reference

Additional details of the Sodium Hypochlorite System can be found in the FSAR, Section 9.7.1.

License Renewal Drawings

The license renewal drawing for the Sodium Hypochlorite System is listed below:

25203-LR26008, Sh. 4

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-4, Sodium Hypochlorite.

The aging management review results for these components are provided in Table 3.3.2-4: Auxiliary Systems - Sodium Hypochlorite - Aging Management Evaluation.

2.3.3.5 REACTOR BUILDING CLOSED COOLING WATER SYSTEM

System Description

The Reactor Building Closed Cooling Water 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 Reactor Building Closed Cooling Water System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by transferring 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 meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system includes EQ equipment and supports fire protection.

The evaluation boundary includes the piping and components that comprise the cooling water loops, components that provide isolation of non-essential heat loads, and non-safety-related piping and components spatially oriented near safety-related components located in the Auxiliary Building.

FSAR Reference

Additional details of the Reactor Building Closed Cooling Water System can be found in the 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.

License Renewal Drawings

The license renewal drawings for the Reactor Building Closed Cooling Water System are listed below:

25203-LR26002, Sh. 2
25203-LR26008, Sh. 2
25203-LR26017, Sh. 1
25203-LR26017, Sh. 3
25203-LR26020, Sh. 2
25203-LR26020, Sh. 4
25203-LR26020, Sh. 5

25203-LR26021, Sh. 2
25203-LR26022, Sh. 1
25203-LR26022, Sh. 2
25203-LR26022, Sh. 3
25203-LR26022, Sh. 4
25203-LR26022, Sh. 5
25203-LR26022, Sh. 6
25203-LR26025, Sh. 1
25203-LR26026, Sh. 1
25203-LR26028, Sh. 1
25203-LR26028, Sh. 4

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-5, Reactor Building Closed Cooling Water.

The aging management review results for these components are provided in Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation.

2.3.3.6 CHILLED WATER SYSTEM

System Description

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 non-safety-related 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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing chilled water to the Vital Switchgear Ventilation System and isolation of the non-safety-related portion of the system during an accident. The Chilled Water System meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system supports fire protection.

The evaluation boundary includes the Chilled Water System piping and components of the vital chilled water subsystem chilled water loops, components that are required to provide isolation of non-safety-related portions of the system, and non-safety-related components located in the Turbine Building with a spatial orientation near a safety-related SSC.

FSAR Reference

Additional details of the Chilled Water System can be found in the FSAR, Sections 9.7.2.1.1, 9.9.16, and 9.9.17.

License Renewal Drawings

The license renewal drawings for the Chilled Water System are listed below:

25203-LR26008, Sh. 3
25203-LR26027, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-6, Chilled Water.

The aging management review results for these components are provided in Table 3.3.2-6: Auxiliary Systems - Chilled Water - Aging Management Evaluation.

2.3.3.7 INSTRUMENT AIR SYSTEM

System Description

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 compressed air is dried and filtered prior to entering the load headers, which service the plant, including the Containment. The dryers and associated filters remove moisture and particulate matter, which prevents corrosion by removing contaminants and limiting the introduction of moisture into the actuators and controllers supplied by the Instrument Air System. The system includes backup compressed air supplies for certain valves that are relied upon during loss of instrument air pressure or fire protection events.

The Instrument Air System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing Containment pressure boundary integrity and backup compressed air for operation of certain safety-related components. The Instrument Air

System meets 10CFR54.4(a)(3) because the system includes EQ equipment and supports fire protection.

The evaluation boundary includes piping and valves that perform a Containment integrity function and Instrument Air System components that provide backup compressed air supply for certain valves that are relied upon during a loss of instrument air pressure or during fire protection events.

FSAR Reference

Additional details of the Instrument Air System can be found in the FSAR, Sections 5.2 and 9.11.

License Renewal Drawings

The license renewal drawings for the Instrument Air System are listed below:

25203-LR26005, Sh. 2
25203-LR26005, Sh. 3
25203-LR26008, Sh. 2
25203-LR26009, Sh. 5
25203-LR26009, Sh. 6
25203-LR26009, Sh. 8
25203-LR26015, Sh. 1
25203-LR26017, Sh. 1
25203-LR26017, Sh. 3
25203-LR26022, Sh. 2
25203-LR26028, Sh. 2
25203-LR26028, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-7, Instrument Air

The aging management review results for these components are provided in Table 3.3.2-7: Auxiliary Systems - Instrument Air - Aging Management Evaluation.

2.3.3.8 NITROGEN SYSTEM

System Description

The Nitrogen System provides clean, dry gas that is utilized in multiple applications throughout the plant.

The Nitrogen System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a pressure boundary for the safety injection system.

The evaluation boundary of the Nitrogen System includes the piping and valves that perform an isolation function at the interface with the Safety Injection System.

FSAR Reference

Additional details of the Nitrogen System can be found in the FSAR, Section 6.3.2.

License Renewal Drawings

The license renewal drawings for the Nitrogen System are listed below:

25203-LR26015, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated inTable 2.3.3-8, Nitrogen.

The aging management review results for these components are provided in Table 3.3.2-8: Auxiliary Systems - Nitrogen - Aging Management Evaluation.

2.3.3.9 STATION AIR SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a Containment pressure boundary integrity. The Station Air System also meets 10CFR54.4(a)(3) because the system provides a pressure boundary for the fire protection water suppression system.

The evaluation boundary includes piping and valves that perform a Containment integrity function and the components that serve as a pressure boundary for the Fire Protection System.

FSAR Reference

Additional details of the Station Air System can be found in the FSAR, Sections 9.11.

License Renewal Drawings

The license renewal drawings for the Station Air System are listed below:

25203-LR26009, Sh. 8
25203-LR26009, Sh. 10
25203-LR26011, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-9, Station Air.

The aging management review results for these components are provided in Table 3.3.2-9: Auxiliary Systems - Station Air - Aging Management Evaluation.

2.3.3.10 HYDROGEN SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(3) by providing for fire mitigation.

The evaluation boundary of the Hydrogen System consists of the excess flow valve, which is an active component. Since the valve is located outside the Turbine Building, the integrity of the valve body is not required for the valve to perform its intended function. Therefore, there are no long-lived, passive components in the Hydrogen System that perform an intended function and no aging management review is required.

FSAR Reference

Additional details of the Hydrogen System can be found in the FSAR, Sections 10.2.5.

License Renewal Drawings

There are no license renewal drawings for the Hydrogen System.

Components Subject to AMR

There are no component groups that require aging management review.

2.3.3.11 CHEMICAL AND VOLUME CONTROL SYSTEM

System Description

The Chemical and Volume Control System provides a method for controlling the inventory and chemistry of the Reactor Coolant System. During normal operation, reactor coolant letdown flow is cooled; conditioned via ion exchangers, filters, and chemical addition; heated; and returned to the Reactor Coolant System. 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 Chemical and Volume Control System provides a high-pressure source of borated water injection to the Reactor Coolant System.

The Chemical and Volume Control System is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing a borated water flowpath to the Reactor Coolant System for reactivity control and for make-up in the event of an accident. The system also provides a Reactor Coolant System pressure boundary at system interfaces; safety-related Regulatory Guide 1.97 indications; and Containment penetration pressure boundary integrity. The Chemical and Volume Control System meets 10 CFR 54.4(a)(2) because the system contains non-safety-related components credited for mitigating the effects of a high-energy line break and non-safety-related components spatially oriented such that a failure could prevent the satisfactory accomplishment of a safety-related function of a safety-related SSC. The Chemical and Volume Control System also meets 10 CFR 54.4(a)(3) because it contains EQ equipment and supports fire protection and station blackout.

The evaluation boundary for the Chemical and Volume Control System consists of components in the letdown and charging flowpath, the components that support borated water injection, and non-safety-related components spatially oriented near safety-related equipment in the Auxiliary Building.

FSAR Reference

Additional details of the Chemical and Volume Control System can be found in the FSAR, Section 9.2.

License Renewal Drawings

The license renewal drawings for the Chemical and Volume Control System are listed below:

25203-LR26017 Sh. 1
25203-LR26017 Sh. 2
25203-LR26017 Sh. 3

25203-LR26020 Sh. 4
25203-LR26020 Sh. 5
25203-LR26022 Sh. 5
25203-LR26031 Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-10, Chemical and Volume Control.

The aging management review results for these components are provided in Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation.

2.3.3.12 SAMPLING SYSTEM

System Description

The Sampling System provides the means for determining chemical and radiological conditions of plant processes and environments.

The Sampling System is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing the capability to obtain post-accident samples, providing a pressure boundary at interfaces with safety-related systems, and providing safety-related Regulatory Guide 1.97 indication. The Sampling System meets 10 CFR 54.4(a)(2) criteria because the system contains non-safety-related 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 meets 10 CFR 54.4(a)(3) criteria because it contains EQ equipment.

The evaluation boundary consists of Sampling System components from the sample point to the sampling station/sink, including non-safety-related components spatially oriented near safety-related SSCs.

FSAR Reference

Additional details of the Sampling System can be found in the FSAR, Section 9.6.

License Renewal Drawings

The license renewal drawings for the Sampling System are listed below:

25203-LR26002 Sh. 2
25203-LR26014 Sh. 2
25203-LR26015 Sh. 1
25203-LR26017 Sh. 1

25203-LR26017 Sh. 2
25203-LR26022 Sh. 1
25203-LR26022 Sh. 5
25203-LR26023 Sh. 2
25203-LR26025 Sh. 1
25203-LR26025 Sh. 2
25203-LR26074 Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-11, Sampling.

The aging management review results for these components are provided in Table 3.3.2-11: Auxiliary Systems - Sampling - Aging Management Evaluation.

2.3.3.13 PRIMARY MAKEUP WATER SYSTEM

System Description

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 is in the scope of license renewal because it meets 10 CFR 54.4(a)(1) by providing Containment penetration pressure boundary integrity and safety-related Regulatory Guide 1.97 indication. The Primary Makeup Water System meets 10 CFR 54.4(a)(2) criteria because the system contains non-safety-related 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 meets 10 CFR 54.4(a)(3) criteria because it contains EQ equipment.

The evaluation boundary of the Primary Makeup Water System includes components that perform a Containment integrity function and non-safety-related components that are spatially oriented near safety-related equipment in the Containment, Auxiliary Building, Turbine Building, and Containment Enclosure Building.

FSAR Reference

Additional details of the Primary Makeup Water System can be found in the FSAR, Section 9.12.

License Renewal Drawings

The license renewal drawings for the Primary Makeup Water System are listed below:

25203-LR26002 Sh. 2
25203-LR26014 Sh. 2
25203-LR26014 Sh. 3
25203-LR26017 Sh. 3
25203-LR26018 Sh. 2
25203-LR26018 Sh. 3
25203-LR26020 Sh. 4
25203-LR26020 Sh. 5
25203-LR26021 Sh. 3
25203-LR26022 Sh. 1
25203-LR26023 Sh. 1
25203-LR26023 Sh. 2
25203-LR26025 Sh. 1
25203-LR26030 Sh. 1
25203-LR26031 Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-12, Primary Makeup Water.

The aging management review results for these components are provided in Table 3.3.2-12: Auxiliary Systems - Primary Makeup Water - Aging Management Evaluation.

2.3.3.14 ACCESS CONTROL AREA AIR CONDITIONING SYSTEM

System Description

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.

The Access Control Area Air Conditioning System is in the scope of license renewal because the system meets 10CFR54.4(a)(3) since it supports fire protection.

The evaluation boundary of the Access Control Area Air Conditioning System consists of the fire dampers within the system.

FSAR Reference

Additional details of the Access Control Area Air Conditioning System can be found in the FSAR, Section 9.9.13.

License Renewal Drawings

The license renewal drawing for the Access Control Area Air Conditioning System is listed below:

25203-LR26027, Sh. 1

Components Subject to AMR

The component group that requires aging management review is indicated in Table 2.3.3-13, Access Control Area Air Conditioning.

The aging management review results for these components are provided in Table 3.3.2-13: Auxiliary Systems - Access Control Area Air Conditioning - Aging Management Evaluation.

2.3.3.15 MAIN CONDENSERS EVACUATION SYSTEM

System Description

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 inleakage and noncondensable gases are removed from the condenser and discharged to the Millstone stack, which is continuously monitored for radioactivity.

The Main Condensers Evacuation System is in the scope of license renewal because the system meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary of the Main Condensers Evacuation System consists of the non-safety-related piping and dampers spatially oriented near the auxiliary feedwater regulating valves located in the Turbine Building and near the Enclosure Building filtration filters and fans in the Auxiliary Building.

FSAR Reference

Additional details of the Main Condensers Evacuation System can be found in the FSAR, Section 10.4.2.

License Renewal Drawings

The license renewal drawing for the Main Condensers Evacuation System is listed below:

25203-LR26028, Sh. 5

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-14, Main Condensers Evacuation.

The aging management review results for these components are provided in Table 3.3.2-14: Auxiliary Systems - Main Condensers Evacuation - Aging Management Evaluation.

2.3.3.16 CONTAINMENT AIR RECIRCULATION AND COOLING SYSTEM

System Description

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 loss-of-coolant-accident or main steam line break accident, the system provide 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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing heat removal from the Containment after an accident, providing Containment pressure boundary integrity, and providing Regulatory Guide 1.97 safety-related indication and signals. The Containment Air Recirculation and Cooling System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports fire protection.

The evaluation boundary includes the entire Containment Air Recirculation and Cooling System.

FSAR Reference

Additional details of the Containment Air Recirculation and Cooling System can be found in the FSAR, Section 6.5.

License Renewal Drawings

The license renewal drawings for the Containment Air Recirculation and Cooling System are listed below:

25203-LR26022, Sh. 5
25203-LR26024, Sh. 1
25203-LR26028, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-15, Containment Air Recirculation and Cooling.

The aging management review results for these components are provided in Table 3.3.2-15: Auxiliary Systems - Containment Air Recirculation and Cooling - Aging Management Evaluation.

2.3.3.17 CONTAINMENT AND ENCLOSURE BUILDING PURGE SYSTEM

System Description

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 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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing automatic isolation and alignment of the system on an actuation signal and providing Containment pressure boundary integrity. The Containment and Enclosure Building Purge System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports fire protection.

The evaluation boundary of the Containment and Enclosure Building Purge System includes dampers and ductwork in the Enclosure Building and the Containment isolation valves and piping associated with Containment penetrations.

FSAR Reference

Additional details of the Containment and Enclosure Building Purge System can be found in the FSAR, Section 9.9.2.

License Renewal Drawings

The license renewal drawing for the Containment and Enclosure Building Purge System is listed below:

25203-LR26028, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-16, Containment and Enclosure Building Purge.

The aging management review results for these components are provided in Table 3.3.2-16: Auxiliary Systems - Containment and Enclosure Building Purge - Aging Management Evaluation

2.3.3.18 CONTAINMENT PENETRATION COOLING SYSTEM

System Description

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 in the scope of license renewal because the system meets 10CFR54.4(a)(2) by providing cooling air to the concrete area surrounding the Containment piping penetrations. The Containment Penetration Cooling System also meets 10CFR54.4(a)(3) because the system supports fire protection.

The evaluation boundary includes the entire Containment Penetration Cooling System.

FSAR Reference

Additional details of the Containment Penetration Cooling System can be found in the FSAR, Section 9.9.4.

License Renewal Drawings

The license renewal drawing for the Containment Penetration Cooling System is listed below:

25203-LR26028, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-17, Containment Penetration Cooling.

The aging management review results for these components are provided in Table 3.3.2-17: Auxiliary Systems - Containment Penetration Cooling - Aging Management Evaluation.

2.3.3.19 CONTAINMENT POST-ACCIDENT HYDROGEN CONTROL SYSTEM

System Description

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 in the scope of license renewal because the system meets 10CFR54.4(a)(1) by controlling the concentration of hydrogen in Containment after an accident to below the lower flammability limit following a LOCA, providing Containment pressure boundary integrity, and providing Regulatory Guide 1.97 safety-related indication and signals. The Containment Post-Accident Hydrogen Control System also meets 10CFR54.4(a)(3) because the system contains EQ equipment.

The evaluation boundary includes the hydrogen recombiner, the recirculation fans and piping, the backup hydrogen purge piping associated with the Containment penetration, the Containment penetration isolation valves and piping, and the hydrogen analyzer and associated sample valves and piping.

FSAR Reference

Additional details of the Containment Post-Accident Hydrogen Control System can be found in the FSAR, Section 6.6.

License Renewal Drawings

The license renewal drawings for the Containment Post-Accident Hydrogen Control System are listed below:

25203-LR26025, Sh. 4
25203-LR26028, Sh. 2
25203-LR26028, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-18, Containment Post - Accident Hydrogen Control.

The aging management review results for these components are provided in Table 3.3.2-18: Auxiliary Systems - Containment Post - Accident Hydrogen Control - Aging Management Evaluation.

2.3.3.20 CONTROL ROOM AIR CONDITIONING SYSTEM

System Description

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 envelope contains the control room area, shift supervisor's office, shift technical advisor's office, viewing gallery, and lobby. During an accident condition, the Control Room Air Conditioning System isolates the fresh air intake and the control room envelope air is recirculated through the control room filtration system.

The Control Room Air Conditioning System is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing heat removal from the control room envelope for equipment cooling and personnel habitability, providing radiological control of the control room envelope for personnel habitability in the event of an accident, and providing Regulatory Guide 1.97 safety-related indications. The Control Room Air Conditioning System also meets 10CFR54.4(a)(3) because the system supports station blackout and fire protection.

The evaluation boundary of the system includes the control room air conditioning subsystem, the control room refrigeration subsystem, the control room filtration subsystem, isolation dampers and associated ductwork for the control room envelope, and system fire dampers.

FSAR Reference

Additional details of the Control Room Air Conditioning System can be found in the FSAR, Sections 9.9.10, 14.8.4.1, and 14.8.4.3.

License Renewal Drawings

The license renewal drawings for the Control Room Air Conditioning System are listed below:

25203-LR26027, Sh. 3
25203-LR26029, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-19, Control Room Air Conditioning.

The aging management review results for these components are provided in Table 3.3.2-19: Auxiliary Systems - Control Room Air Conditioning - Aging Management Evaluation.

2.3.3.21 CONTROL ELEMENT DRIVE MECHANISM COOLING SYSTEM

System Description

The Control Element Drive Mechanism Cooling System consists of three fan-coil units that draw Containment air across finned-tube cooling coils and supply the cooled air to the control element drive mechanism shroud. The cooling coils are cooled by the Reactor Building Closed Cooling Water System.

The Control Element Drive Mechanism Cooling System is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing a pressure boundary for the Reactor Building Closed Cooling Water System.

The evaluation boundary of the Control Element Drive Mechanism Cooling System consists of the cooling coils that form the Reactor Building Closed Cooling Water System pressure boundary.

FSAR Reference

Additional details of the Control Element Drive Mechanism Cooling System can be found in the FSAR, Section 9.9.1.

License Renewal Drawings

The license renewal drawings for the Control Element Drive Mechanism Cooling System are listed below:

25203-LR26022, Sh. 4
25203-LR26028, Sh. 1

Components Subject to AMR

The component group that requires aging management review is indicated in Table 2.3.3-20, Control Element Drive Mechanism Cooling.

The aging management review results for these components are provided in Table 3.3.2-20: Auxiliary Systems - Control Element Drive Mechanism Cooling - Aging Management Evaluation.

2.3.3.22 DIESEL GENERATOR VENTILATION SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing heat removal to maintain a suitable environment for the operation of the emergency diesel generators. The Diesel Generator Ventilation System meets 10CFR54.4(a)(2) because the system contains non-safety-related components used to mitigate the effects of a HELB. The Diesel Generator Ventilation System also meets 10CFR54.4(a)(3) because the system supports fire protection and station blackout.

The evaluation boundary of the system includes the safety-related supply and exhaust portion of the system, the intake ductwork of the non-safety-related portion of the system, and the fire dampers.

FSAR Reference

Additional details of the Diesel Generator Ventilation System can be found in the FSAR, Section 9.9.11.

License Renewal Drawings

The license renewal drawing for the Diesel Generator Ventilation System is listed below:

25203-LR26027, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-21, Diesel Generator Ventilation.

The aging management review results for these components are provided in Table 3.3.2-21: Auxiliary Systems - Diesel Generator Ventilation - Aging Management Evaluation.

2.3.3.23 ESF ROOM AIR RECIRCULATION SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing heat removal from the ESF room atmosphere for ESF equipment cooling. The ESF Room Air Recirculation System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports fire protection.

The evaluation boundary of the system includes the ESF room air recirculation air handling units and associated ductwork, the normal supply and exhaust ductwork required for ESF room isolation, and the fire dampers.

FSAR Reference

Additional details of the ESF Room Air Recirculation System can be found in the FSAR, Section 9.9.7.

License Renewal Drawings

The license renewal drawings for the ESF Room Air Recirculation System are listed below:

25203-LR26022, Sh. 2
25203-LR26028, Sh. 4
25203-LR26029, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-22, ESF Room Air Recirculation.

The aging management review results for these components are provided in Table 3.3.2-22: Auxiliary Systems - ESF Room Air Recirculation - Aging Management Evaluation.

2.3.3.24 ENCLOSURE BUILDING FILTRATION SYSTEM

System Description

The functions of the Enclosure Building Filtration System are to collect and process any potential radioactivity released from the Containment after a LOCA, or from the Auxiliary Building after a fuel handling accident in the spent fuel pool, to the Enclosure Building filtration region. The Enclosure Building filtration region includes the region between the penetration rooms, the engineered safety feature 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 Millstone stack.

The Enclosure Building Filtration System is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing 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 10CFR100 limits, providing a negative pressure in the Enclosure Building filtration region in the event of a LOCA or rod ejection accident, and providing a flowpath for backup hydrogen purge to the Millstone stack. The Enclosure Building Filtration System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports fire protection.

The evaluation boundary of the system includes the entire system, except for the portion of the system downstream of the isolation to the main exhaust system.

FSAR Reference

Additional details of the Enclosure Building Filtration System can be found in the 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.

License Renewal Drawings

The license renewal drawings for the Enclosure Building Filtration System are listed below:

25203-LR26021, Sh. 2
25203-LR26024, Sh. 3
25203-LR26028, Sh. 3
25203-LR26028, Sh. 4
25203-LR26028, Sh. 5
25212-LR26948, Sh. 7

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-23, Enclosure Building Filtration.

The aging management review results for these components are provided in Table 3.3.2-23: Auxiliary Systems - Enclosure Building Filtration - Aging Management Evaluation.

2.3.3.25 FUEL HANDLING AREA VENTILATION SYSTEM

System Description

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. Prior to handling irradiated fuel, 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 contains fire dampers to prevent the spread of fire.

The Fuel Handling Area Ventilation System is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing 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 meets 10CFR54.4(a)(3) because the system contains components that support fire protection.

The evaluation boundary of the Fuel Handling Area Ventilation System includes the supply and exhaust portion of the system that isolates the fuel handling area during an accident, the piping to the system radiation monitor, the exhaust portion of the system that provides a flowpath to the Enclosure Building Filtration System, and the fire dampers.

FSAR Reference

Additional details of the Fuel Handling Area Ventilation System system can be found in the FSAR, Section 9.9.8.

License Renewal Drawings

The license renewal drawings for the Fuel Handling Area Ventilation System are listed below:

25203-LR26028, Sh. 5
25203-LR26029, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-24, Fuel Handling Area Ventilation.

The aging management review results for these components are provided in Table 3.3.2-24: Auxiliary Systems - Fuel Handling Area Ventilation - Aging Management Evaluation

2.3.3.26 MAIN EXHAUST VENTILATION SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing system isolation upon receipt of a Containment isolation signal and providing Regulatory Guide 1.97 safety-related indications. The Main Exhaust Ventilation System also meets 10CFR54.4(a)(3) because the system supports fire protection.

The evaluation boundary of the Main Exhaust Ventilation System includes the filtration unit, ductwork, and dampers that are in the Containment purge flowpath and the system fire dampers.

FSAR Reference

Additional details of the Main Exhaust Ventilation System can be found in the FSAR, Section 9.9.9.

License Renewal Drawings

The license renewal drawing for the Main Exhaust Ventilation System is listed below:

25203-LR26028, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-25, Main Exhaust Ventilation.

The aging management review results for these components are provided in Table 3.3.2-25: Auxiliary Systems - Main Exhaust Ventilation - Aging Management Evaluation.

2.3.3.27 NON-RADIOACTIVE AREA VENTILATION SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(2) since the system contains non-safety-related components that are used to mitigate the effects of a HELB and the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system supports station blackout and fire protection.

The evaluation boundary of the Non-Radioactive Area Ventilation System includes the roof exhausters, dampers, and ductwork from the battery room, the cable vault recirculation unit cooling coils that are spatially oriented near safety-related SSCs, and the fire dampers.

FSAR Reference

Additional details of the Non-Radioactive Area Ventilation System can be found in the FSAR, Section 9.9.6.

License Renewal Drawings

The license renewal drawings for the Non-Radioactive Area Ventilation System are listed below:

25203-LR26027, Sh. 1
25203-LR26027, Sh. 2
25203-LR26029, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-26, Non-Radioactive Area Ventilation.

The aging management review results for these components are provided in Table 3.3.2-26: Auxiliary Systems - Non-Radioactive Area Ventilation - Aging Management Evaluation.

2.3.3.28 PROCESS AND AREA RADIATION MONITORING SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing a pressure boundary for interfacing systems, providing Containment pressure boundary integrity, providing an actuation of certain systems or components in response to detected radiation conditions, and providing Regulatory Guide 1.97 safety-related indications. The Process and Area Radiation Monitoring System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports station blackout.

The evaluation boundary consists of Containment isolation valves and associated piping at Process and Area Radiation Monitoring System Containment penetrations and the hydrogen analyzer unit return piping and valves.

FSAR Reference

Additional details of the Process and Area Radiation Monitoring System can be found in the FSAR, Section 7.5.6.

License Renewal Drawings

The license renewal drawings for the Process and Area Radiation Monitoring System are listed below:

25203-LR26028, Sh. 2
25203-LR26029, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-27, Process and Area Radiation Monitoring.

The aging management review results for these components are provided in Table 3.3.2-27: Auxiliary Systems - Process and Area Radiation Monitoring - Aging Management Evaluation.

2.3.3.29 RADWASTE AREA VENTILATION SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by isolating normal ventilation from the engineered safety features pump rooms on an Enclosure Building Filtration System actuation signal. The Radwaste Area Ventilation System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports fire protection.

The evaluation boundary of the Radwaste Area Ventilation System is limited to the isolation ductwork and dampers that provide the Enclosure Building Filtration System boundary and the fire dampers in the system.

FSAR Reference

Additional details of the Radwaste Area Ventilation System can be found in the FSAR, Section 9.9.5.

License Renewal Drawings

The license renewal drawings for the Radwaste Area Ventilation System are listed below:

25203-LR26029, Sh. 2
25203-LR26029, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-28, Radwaste Area Ventilation.

The aging management review results for these components are provided in Table 3.3.2-28: Auxiliary Systems - Radwaste Area Ventilation - Aging Management Evaluation.

2.3.3.30 TURBINE BUILDING VENTILATION SYSTEM

System Description

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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing 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 meets 10CFR54.4(a)(3) since the system supports fire protection.

The evaluation boundary of the system consists of the fire dampers.

FSAR Reference

Additional details of the Turbine Building Ventilation System can be found in the FSAR, Section 9.9.12.

License Renewal Drawings

The license renewal drawing for the Turbine Building Ventilation System is listed below:

25203-LR26027, Sh. 1

Components Subject to AMR

The component group that requires aging management review is indicated in Table 2.3.3-29, Turbine Building Ventilation.

The aging management review results for these components are provided in Table 3.3.2-29: Auxiliary Systems - Turbine Building Ventilation - Aging Management Evaluation

2.3.3.31 VITAL SWITCHGEAR VENTILATION SYSTEM

System Description

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% 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 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 is in the scope of license renewal because the system meets 10CFR54.4(a)(1) by providing cooling to maintain a suitable environment for the operation of safety-related electrical equipment. The Vital Switchgear Ventilation System also meets 10CFR54.4(a)(3) because the system contains EQ equipment and supports station blackout and fire protection.

The evaluation boundary of the system includes the upper and lower 4160V switchgear room cooling units, “A” DC switchgear room and “B” DC switchgear room cooling units, West 480V load center cooling units, and the associated dampers and ductwork. The evaluation boundary also includes the East 480V load center supply ductwork and exhaust fan, the 480V load center room emergency vent fans, the DC switchgear room emergency vent fans, the MCC air conditioning units, and the associated system fire dampers.

<u>FSAR Reference</u>

Additional details of the Vital Switchgear Ventilation System can be found in the FSAR, Sections 9.7.2, 9.9.15 and 9.9.17.

<u>License Renewal Drawings</u>

The license renewal drawings for the Vital Switchgear Ventilation System are listed below:

25203-LR26008, Sh. 3
25203-LR26027, Sh. 1
25203-LR26027, Sh. 2
25203-LR26029, Sh. 1
25203-LR26029, Sh. 2
25203-LR26029, Sh. 3

<u>Components Subject to AMR</u>

The component groups that require aging management review are indicated in Table 2.3.3-30, Vital Switchgear Ventilation.

The aging management review results for these components are provided in Table 3.3.2-30: Auxiliary Systems - Vital Switchgear Ventilation - Aging Management Evaluation.

2.3.3.32 UNIT 2 FIRE PROTECTION SYSTEM

The Millstone Power Station 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.

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing Containment pressure boundary integrity. The Fire Protection System also meets 10CFR54.4(a)(3) because it 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.

The evaluation boundary includes piping and valves that perform a Containment integrity function and the fire protection components that are required for compliance with the 10CFR50.48 licensing basis.

FSAR Reference

Additional details of the Unit 2 Fire Protection System can be found in the FSAR, Section 9.10.

License Renewal Drawings

The license renewal drawings for the Unit 2 Fire Protection System are listed below:

25202-LR26019, Sh. 8
25202-LR26019, Sh. 10
25203-LR26008, Sh. 2
25203-LR26011, Sh. 1
25203-LR26011, Sh. 4

25203-LR26011, Sh. 5
25205-LR25003, Sh. 1
25212-LR26946, Sh. 2
25212-LR26970, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-31, Unit 2 Fire Protection.

The aging management review results for these components are provided in Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation.

2.3.3.33 UNIT 3 FIRE PROTECTION SYSTEM

The Millstone Power Station 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 3 license renewal application.

System Description

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 Unit 3 Fire Protection System includes fire dampers and tornado relief dampers. The system also includes the RCP motor oil collection system components.

The Unit 3 Fire Protection System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing Containment pressure boundary integrity, Regulatory Guide 1.97 safety-related indication, and pressure relief for tornado protection in the cable spreading area. The Unit 3 Fire Protection System also meets 10CFR54.4(a)(3) because it 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, and contains EQ components.

The evaluation boundary includes piping and valves that perform a Containment integrity function and the fire protection components that are required for compliance with the 10CFR50.48 licensing basis.

FSAR Reference

Additional details of the Unit 3 Fire Protection System can be found in the Millstone Unit 3 FSAR, Section 9.5.1, 9.5.11, and Fire Protection Evaluation Report.

License Renewal Drawings

The license renewal drawings for the Unit 3 Fire Protection System are listed below:

25202-LR26019, Sh. 3
25202-LR26019, Sh. 8
25203-LR26026, Sh. 5
25205-LR25003, Sh. 1
25212-LR26946, Sh. 1
25212-LR26946, Sh. 2
25212-LR26946, Sh. 3
25212-LR26946, Sh. 4
25212-LR26970, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-32, Unit 3 Fire Protection.

The aging management review results for these components are provided in Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

2.3.3.34 DOMESTIC WATER SYSTEM

System Description

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, Connecticut.

The Domestic Water System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing control room envelope pressure boundary integrity. The Domestic Water System meets 10CFR54.4(a)(2) since the system contains non-safety-related components spatially oriented such that their failure could prevent the satisfactory accomplishment of a safety-related function associated with a safety-related SSC.

The evaluation boundary includes the piping and components that perform a control room envelope pressure boundary integrity function and components with a spatial orientation near safety-related equipment throughout the plant.

FSAR Reference

Additional details of the Domestic Water System can be found in the FSAR, Section 9.12.

License Renewal Drawings

The license renewal drawings for the Domestic Water System system are listed below:

25203-LR26011, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-33, Domestic Water.

The aging management review results for these components are provided in Table 3.3.2-33: Auxiliary Systems - Domestic Water - Aging Management Evaluation

2.3.3.35 DIESEL GENERATOR SYSTEM

System Description

The purpose of the Diesel Generator 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 Diesel Generator System is comprised of two identical emergency diesel generators. Each emergency diesel generator supplies 4160 Vac power to its respective emergency bus. The Diesel Generator System includes the starting air subsystem, lubricating oil subsystem, jacket/air cooling subsystem, and the scavenging air intake and exhaust subsystem.

The Diesel Generator System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a reliable source of emergency power for the required loads.The Diesel Generator System meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system supports station blackout and fire protection.

The evaluation boundary of the Diesel Generator System consists of the components of the starting air subsystem, lubricating oil subsystem, jacket/air cooling subsystem, and the scavenging air intake and exhaust subsystem required for operation of the emergency diesel generators, including non-safety-related components that are spatially oriented near safety-related SSCs. The diesel engine and electrical generator are active components and are not subject to aging management review.

FSAR Reference

Additional details of the Diesel Generator System can be found in the FSAR, Section 8.3.

License Renewal Drawings

The license renewal drawings for the Diesel Generator System are listed below:

25203-LR-26008, Sh. 2
25203-LR-26010, Sh. 1
25203-LR-26018, Sh. 2
25203-LR-26018, Sh. 3
25203-LR-26018, Sh. 4
25203-LR-26018, Sh. 5

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-34, Diesel Generator.

The aging management review results for these components are provided in Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation.

2.3.3.36 DIESEL GENERATOR FUEL OIL SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing adequate fuel oil to support the safety function of the diesel generators. The Diesel Generator Fuel Oil System meets 10CFR54.4(a)(2) because the system contains a non-safety-related fuel oil storage tank and transfer system and contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system supports station blackout and fire protection.

The evaluation boundary of the Diesel Generator Fuel Oil System includes the components that are required to provide fuel oil to the diesel generators and the non-safety-related components near safety-related equipment in the diesel generator rooms.

FSAR Reference

Additional details of the Diesel Generator Fuel Oil System can be found in the FSAR, Section 8.3.

License Renewal Drawings

The license renewal drawing for the Diesel Generator Fuel Oil System is listed below:

25203-LR-26010, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-35, Diesel Generator Fuel Oil.

The aging management review results for these components are provided in Table 3.3.2-35: Auxiliary Systems - Diesel Generator Fuel Oil - Aging Management Evaluation.

2.3.3.37 STATION BLACKOUT DIESEL GENERATOR SYSTEM

The Millstone Station Blackout 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.

System Description

The purpose of the Station Blackout Diesel Generator System, installed in response to 10CFR50.63, is to provide an alternate ac power source to either Millstone Unit 2 or Millstone Unit 3 emergency bus. The Station Blackout 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 Station Blackout Diesel Generator System is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting station blackout and fire protection.

The evaluation boundary of the Station Blackout Diesel Generator System consists of the components of the lubricating oil subsystem, engine cooling subsystem, air intake and exhaust subsystem, fuel oil subsystem, and starting air subsystem required for operation of the station blackout diesel generator. The diesel engine and electrical generator are considered active components and are not subject to aging management review.

FSAR Reference

Additional details of the Station Blackout Diesel Generator System can be found in the FSAR, Section 1.2.9 and in the Millstone Unit 3 FSAR, Section 8.3.1.

License Renewal Drawings

The license renewal drawings for the Station Blackout Diesel Generator System are listed below:

25212-LR-26958, Sh. 1
25212-LR-26958, Sh. 2
25212-LR-26958, Sh. 3
25212-LR-26958, Sh. 4
25212-LR-26958, Sh. 5

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-36, Station Blackout Diesel Generator.

The aging management review results for these components are provided in Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation.

2.3.3.38 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.

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(3) by providing yard lighting, and back-up electrical power for yard lighting, in support of fire protection.

The evaluation boundary of the Security System consists of the components of the lubricating oil subsystem, engine cooling subsystem, fuel oil subsystem, and the air intake and exhaust subsystem required for operation of the security diesel generator. The diesel engine and electrical generator are active components and are not subject to aging management review.

Security perimeter lighting support structures are addressed in Section 2.4.2.22, Yard Structures.

FSAR Reference

None

License Renewal Drawings

None

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-37, Security.

The aging management review results for these components are provided in Table 3.3.2-37: Auxiliary Systems - Security - Aging Management Evaluation.

2.3.3.39 CLEAN LIQUID WASTE PROCESSING SYSTEM

System Description

The Clean Liquid Waste Processing System collects, stores, processes, recycles, and disposes of liquid radioactive waste.

The Clean Liquid Waste Processing System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing pressure boundary integrity and isolation for the Containment and interfacing safety-related systems, and Regulatory Guide 1.97 safety-related indications. The Clean Liquid Waste Processing System meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system contains EQ components.

The evaluation boundary of the Clean Liquid Waste Processing System consists of the heat exchangers that provide a Reactor Building Closed Cooling Water System pressure boundary, the piping and valves that provide pressure boundary integrity at interfacing systems, the Containment isolation piping and valves, and the components that are spatially-oriented near a safety-related SSC.

FSAR References

Additional details of the Clean Liquid Waste Processing System can be found in the FSAR, Section 11.1.3.

License Renewal Drawings

The license renewal drawings for the Clean Liquid Waste Processing System are listed below:

25203-LR26014, Sh. 1
25203-LR26014, Sh. 2
25203-LR26015, Sh. 3
25203-LR26017, Sh. 2
25203-LR26020, Sh. 4
25203-LR26020, Sh. 5
25203-LR26022, Sh. 4
25203-LR26022, Sh. 5
25203-LR26024, Sh. 1
25203-LR26026, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-38, Clean Liquid Waste Processing.

The aging management review results for these components are provided in Table 3.3.2-38: Auxiliary Systems - Clean Liquid Waste Processing - Aging Management Evaluation

2.3.3.40 GASEOUS WASTE PROCESSING SYSTEM

System Description

The Gaseous Waste Processing System processes and controls the release of potentially radioactive waste gases.

The Gaseous Waste Processing System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing pressure boundary integrity and isolation for the Containment and interfacing safety-related systems, and providing Regulatory Guide 1.97 safety-related indication. The Gaseous Waste Processing System also meets 10CFR54.4(a)(3) because the system contains EQ components.

The evaluation boundary of the Gaseous Waste Processing System consists of the components that provide pressure boundary integrity at interfacing systems and the Containment isolation piping and valves.

FSAR References

Additional details of the Gaseous Waste Processing System can be found in the FSAR, Section 11.1.4.

License Renewal Drawings

The license renewal drawings for the Gaseous Waste Processing System are listed below:

25203-LR26021, Sh. 2
25203-LR26022, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-39, Gaseous Waste Processing.

The aging management review results for these components are provided in Table 3.3.2-39: Auxiliary Systems - Gaseous Waste Processing - Aging Management Evaluation

2.3.3.41 POST ACCIDENT SAMPLING SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing the capability to obtain a post accident sample of the Containment atmosphere and the primary coolant. The Post Accident Sampling System meets 10CFR54.4(a)(2) since the system contains non-safety-related 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.

The evaluation boundary of the Post Accident Sampling System includes the entire system.

FSAR References

Additional details of the Post Accident Sampling System can be found in the FSAR, Section 9.6.2.

License Renewal Drawings

The license renewal drawings for the Post Accident Sampling System are listed below:

25203-LR26014, Sh. 2
25203-LR26015, Sh. 1
25203-LR26025, Sh. 1
25203-LR26025, Sh. 4
25203-LR26074, Sh. 1
25203-LR26074, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-40, Post Accident Sampling.

The aging management review results for these components are provided in Table 3.3.2-40: Auxiliary Systems - Post Accident Sampling - Aging Management Evaluation.

2.3.3.42 STATION SUMPS AND DRAINS SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing Containment pressure boundary integrity, isolation between the emergency diesel generator rooms, and Regulatory Guide 1.97 safety-related indication. The Station Sumps and Drains System meets 10CFR54.4(a)(2) since the system provides both flood protection for safety-related areas and provides loop seals to maintain ventilation zone separation. The system also contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system contains EQ components.

The evaluation boundary the Station Sumps and Drains System includes the Containment isolation piping and valves, the loop seals that provide ventilation zone separation, the backflow preventers in the emergency diesel generator rooms floor drains, the safeguards pump rooms sump pumps, the auxiliary feedwater pump rooms sump pumps, and the valves and piping that are spatially oriented near safety-related equipment.

FSAR References

None

License Renewal Drawings

The license renewal drawings for the Station Sumps and Drains System are listed below:

25203-LR26012, Sh. 1
25203-LR26024, Sh. 1
25203-LR26024, Sh. 2
25203-LR26024, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.3-41, Station Sumps and Drains.

The aging management review results for these components are provided in Table 3.3.2-41: Auxiliary Systems - Station Sumps and Drains - Aging Management Evaluation.

Screening Results Tables: Auxiliary Systems

See Table 2.0-1 for definition of intended function.

Table 2.3.3-1 Circulating Water

Component Type	Intended Function(s)
Expansion Joints	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-2 Screen Wash

Component Type	Intended Function(s)
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Strainers	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-3 Service Water

Component Type	Intended Function(s)
Expansion Joints	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flow Elements	Pressure Boundary
Flow Indicators	Limited Structural Integrity, Pressure Boundary
Flow Orifices	Limited Structural Integrity, Pressure Boundary, Restricts Flow
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Pressure Boundary
Restricting Orifices	Limited Structural Integrity, Pressure Boundary, Restricts Flow
SW Pump Motor Protective Tank	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-4 Sodium Hypochlorite

Component Type	Intended Function(s)
Pipe	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-5 Reactor Building Closed Cooling Water

Component Type	Intended Function(s)
Flow Elements	Pressure Boundary
Flow Indicators	Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Flow Switches	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Pressure Boundary
RBCCW Heat Exchangers	Heat Transfer, Pressure Boundary
RBCCW Surge Tank	Pressure Boundary
Reactor Vessel Support Concrete Cooling Coils	Pressure Boundary
Tubing	Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-6 Chilled Water

Component Type	Intended Function(s)
Chilled Water Chillers	Heat Transfer, Pressure Boundary
Chilled Water Evaporators	Pressure Boundary
Chilled Water Surge Tank	Pressure Boundary
Compressor Casings	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Level Indicators	Pressure Boundary
Moisture Indicators	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-7 Instrument Air

Component Type	Intended Function(s)
Accumulators	Pressure Boundary
Hoses	Pressure Boundary
Pipe	Pressure Boundary
Regulators	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-8 Nitrogen

Component Type	Intended Function(s)
Pipe	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-9 Station Air

Component Type	Intended Function(s)
Pipe	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-10 Chemical and Volume Control

Component Type	Intended Function(s)
Bolting	Limited Structural Integrity, Pressure Boundary
Boric Acid Tanks	Pressure Boundary
Filter/strainers	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Flow Indicators	Pressure Boundary
Letdown Heat Exchanger	Limited Structural Integrity, Pressure Boundary
Level Indicators	Pressure Boundary
Lube Oil Reservoirs	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pulsation Dampeners	Pressure Boundary
Pumps	Pressure Boundary
Regenerative Heat Exchanger	Pressure Boundary
Suction Stabilizers	Pressure Boundary
Sump Tanks	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary
Volume Control Tank	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-11 Sampling

Component Type	Intended Function(s)
Bolting	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Sample Coolers	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-12 Primary Makeup Water

Component Type	Intended Function(s)
Bolting	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Primary Water Head Tank	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-13 Access Control Area Air Conditioning

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-14 Main Condensers Evacuation

Component Type	Intended Function(s)
Damper Housings	Limited Structural Integrity, Pressure Boundary
Ductwork	Limited Structural Integrity, Pressure Boundary
Fan/blower Housings	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-15 Containment Air Recirculation and Cooling

Component Type	Intended Function(s)
Containment Air Recirculation Cooling Unit Coils	Pressure Boundary
Containment Air Recirculation Cooling Unit Housings	Pressure Boundary
Damper Housings	Pressure Boundary
Ductwork	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flow Elements	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-16 Containment and Enclosure Building Purge

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Flex Connections	Pressure Boundary
Pipe	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-17 Containment Penetration Cooling

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flex Connections	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-18 Containment Post - Accident Hydrogen Control

Component Type	Intended Function(s)
Detection Chambers	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flexible Hoses	Pressure Boundary
Flow Elements	Pressure Boundary
Flow Orifices	Pressure Boundary
Hydrogen Recombiner Housings	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-19 Control Room Air Conditioning

Component Type	Intended Function(s)
Compressor Casings	Pressure Boundary
Control Room Air Handling Units	Filtration, Pressure Boundary
Control Room Filter Banks	Filtration, Pressure Boundary
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Filter Dryer	Pressure Boundary
Moisture Indicators	Pressure Boundary
Mufflers	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-20 Control Element Drive Mechanism Cooling

Component Type	Intended Function(s)
CEDM Cooling Coils	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-21 Diesel Generator Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flex Connections	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-22 ESF Room Air Recirculation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
ESF Room Air Recirculation Unit Cooling Coils	Pressure Boundary
ESF Room Air Recirculation Unit Housings	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flex Connections	Pressure Boundary
Pipe	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-23 Enclosure Building Filtration

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Enclosure Building Filtration Filter Bank Housings	Filtration, Pressure Boundary
Fan/blower Housings	Pressure Boundary
Flex Connections	Pressure Boundary
Flow Elements	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-24 Fuel Handling Area Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Flow Elements	Pressure Boundary
Pipe	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-25 Main Exhaust Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Filter Bank Housing	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-26 Non-Radioactive Area Ventilation

Component Type	Intended Function(s)
Cable Vault Recirc Unit Cooling Coils	Limited Structural Integrity, Pressure Boundary
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Fan/blower Housings	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-27 Process and Area Radiation Monitoring

Component Type	Intended Function(s)
Bolting	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-28 Radwaste Area Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-29 Turbine Building Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-30 Vital Switchgear Ventilation

Component Type	Intended Function(s)
Damper Housings	Fire Barrier, Pressure Boundary
DC SWGR A/C Unit Cooling Coils	Pressure Boundary
DC SWGR A/C Unit Housings	Pressure Boundary
Ductwork	Pressure Boundary
Ductwork Joint Seals	Pressure Boundary
Fan/blower Housings	Pressure Boundary
MCC A/C Units	Pressure Boundary
Pipe	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary
Vital SWGR Cooling Unit Coils	Heat Transfer, Pressure Boundary
Vital SWGR Cooling Unit Housings	Pressure Boundary
West 480V LCR Cooling Unit Coils	Heat Transfer, Pressure Boundary
West 480V LCR Cooling Unit Housings	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-31 Unit 2 Fire Protection

Component Type	Intended Function(s)
Drip Pans	Enclosure Protection
Fire Hydrants	Pressure Boundary
Flame Arrestors	Fire Barrier
Flex Connections	Pressure Boundary
Flow Indicators	Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Nozzles	Spray Pattern
Pipe	Pressure Boundary
Pumps	Pressure Boundary
RCP Oil Collection Tanks	Pressure Boundary
Retard Chambers	Pressure Boundary
Sprinkler Heads	Pressure Boundary, Spray Pattern
Strainers	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary
Water Motor Gongs	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-32 Unit 3 Fire Protection

Component Type	Intended Function(s)
CO_2 Storage Tank	Pressure Boundary
CO_2 Tank Cooling Coils	Pressure Boundary
Coolant Heat Exchanger	Heat Transfer, Pressure Boundary
Damper Housings	Fire Barrier, Pressure Boundary
Diesel Fuel Storage Tank	Pressure Boundary
Drip Pans	Enclosure Protection
Ductwork	Pressure Boundary
Exhaust Silencer	Pressure Boundary
Expansion Tank Overflow Container	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Fire Hydrants	Pressure Boundary
Fire Protection RCP Oil Collection Tanks	Pressure Boundary
Fire Water Storage Tank	Pressure Boundary
Flame Arrestors	Fire Barrier
Flex Connections	Pressure Boundary
Flexible Hoses	Pressure Boundary
Flow Switches	Pressure Boundary
Heater Unit	Pressure Boundary
Hydropneumatic Tank	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-32 Unit 3 Fire Protection

Component Type	Intended Function(s)
Instrument Snubbers	Pressure Boundary
Level Indicators	Pressure Boundary
Lube Oil Cooler	Heat Transfer, Pressure Boundary
Nozzles	Spray Pattern
Odorizers	Pressure Boundary
Oil Mist Recovery Unit	Pressure Boundary
Oil Reservoirs	Pressure Boundary
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Restricting Orifices	Pressure Boundary, Restricts Flow
Sprinkler Heads	Pressure Boundary, Spray Pattern
Tubing	Pressure Boundary
Vacuum Limiter	Pressure Boundary
Valves	Pressure Boundary
Vortex Breaker Assembly	Pressure Boundary, Vortex Suppression
Water Cooled Exhaust Manifold	Pressure Boundary
Water Manifold	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-33 Domestic Water

Component Type	Intended Function(s)
Pipe	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-34 Diesel Generator

Component Type	Intended Function(s)
Air Cooling Heat Exchangers	Heat Transfer, Pressure Boundary
Air Intercoolers	Pressure Boundary
Air Start Distributors	Pressure Boundary
Expansion Joints	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Governor Hydraulic Oil Boosters	Pressure Boundary
Jacket Water Expansion Tanks	Pressure Boundary
Jacket Water Heat Exchangers	Heat Transfer, Pressure Boundary
Level Indicators	Pressure Boundary
Lube Oil Heat Exchangers	Heat Transfer, Pressure Boundary
Lube Oil Heaters	Pressure Boundary
Oil Pans	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Pressure Boundary
Silencers	Pressure Boundary
Stand-By Jacket Coolant Heaters	Pressure Boundary
Starting Air Tanks	Pressure Boundary
Tubing	Pressure Boundary
Turbochargers	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-34 Diesel Generator

Component Type	Intended Function(s)
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-35 Diesel Generator Fuel Oil

Component Type	Intended Function(s)
Clean Oil Storage Tanks	Limited Structural Integrity, Pressure Boundary
Diesel Fuel Oil Storage Tank	Pressure Boundary
Diesel Oil Supply Tanks	Pressure Boundary
Filter/strainers	Filtration, Limited Structural Integrity, Pressure Boundary
Flame Arrestors	Fire Barrier
Level Indicators	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-36 Station Blackout Diesel Generator

Component Type	Intended Function(s)
Aftercoolers	Pressure Boundary
Air Receivers	Pressure Boundary
Aspirators	Pressure Boundary
Expansion Joints	Pressure Boundary
Expansion Tanks	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flame Arrestors	Fire Barrier
Flow Indicators	Pressure Boundary
Fuel Heaters	Pressure Boundary
Fuel Oil Day Tanks	Pressure Boundary
Fuel Oil Storage Tanks	Pressure Boundary
Immersion Heaters	Pressure Boundary
Injectors	Pressure Boundary
Lube Oil Coolers	Pressure Boundary
Lubricators	Pressure Boundary
Oil Sumps	Pressure Boundary
Pipe	Pressure Boundary
Pulsation Dampeners	Pressure Boundary
Pumps	Pressure Boundary
Radiators	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-36 Station Blackout Diesel Generator

Component Type	Intended Function(s)
Restricting Orifices	Pressure Boundary, Restricts Flow
Silencers	Pressure Boundary
Tubing	Pressure Boundary
Turbo Chargers	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-37 Security

Component Type	Intended Function(s)
Coolers	Pressure Boundary
Diesel Fuel Oil Storage Tank	Pressure Boundary
Fan/blower Housings	Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Heaters	Pressure Boundary
Oil Pans	Pressure Boundary
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Radiators	Pressure Boundary
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-38 Clean Liquid Waste Processing

Component Type	Intended Function(s)
Degasifier After Cooler	Pressure Boundary
Degasifier Effluent Cooler	Pressure Boundary
Degasifier Preheater	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
PDT and Quench Tank Cooler	Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Primary Drain Tank	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Strainers	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-39 Gaseous Waste Processing

Component Type	Intended Function(s)
Aftercoolers	Pressure Boundary
Pipe	Pressure Boundary
Valves	Pressure Boundary
Waste Gas Compressor Seal Coolers	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-40 Post Accident Sampling

Component Type	Intended Function(s)
Accumulators	Pressure Boundary
Bolting	Limited Structural Integrity, Pressure Boundary
Filter/strainers	Filtration, Pressure Boundary
Flow Elements	Pressure Boundary
Pumps	Pressure Boundary
Reservoir	Pressure Boundary
Sample Chambers	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.3-41 Station Sumps and Drains

Component Type	Intended Function(s)
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Flood Barrier, Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

2.3.4.1 MAIN STEAM SYSTEM

System Description

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 and provides a flowpath for steam generator blowdown.

The design of the Main Steam System ensures a supply of steam to the steam-driven auxiliary feedwater pump turbine under all design-basis accident conditions. The design also prevents the uncontrolled blowdown of more than one steam generator following a main steam line break accident.

The Main Steam System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a steam flow path to remove heat from the Reactor Coolant System, overpressure protection for the steam generators, steam to the steam generator auxiliary feedwater pump turbine, isolation at system interfaces, Containment pressure boundary integrity, and Regulatory Guide 1.97 safety-related indication. The Main Steam System also prevents uncontrolled blowdown of more than one steam generator following a main steam line break, limits the maximum steam flow rate from a faulted steam generator, and provides steam generator isolation. The Main Steam System meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 non-safety-related components credited for mitigating a high energy line break outside Containment. The system also meets 10CFR54.4(a)(3) because the system includes EQ components and supports fire protection and station blackout.

The evaluation boundary includes the blowdown lines, the steam lines from the steam generators to the main turbine and auxiliary feedwater pump turbine, and non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Enclosure Building and the Turbine Building.

FSAR References

Additional details of the Main Steam System can be found in the FSAR, Sections 7.2.3, 7.5.6, 10.3, 10.4.5.3, 10.4.5.4.4, 10.4.6, and Chapter 14.

License Renewal Drawings

The license renewal drawings for the Main Steam System are listed below:

25203-LR26002, Sh. 1
25203-LR26002, Sh. 2
25203-LR26002, Sh. 3
25203-LR26002, Sh. 4
25203-LR26003, Sh. 1
25203-LR26003, Sh. 2
25203-LR26004, Sh. 1
25203-LR26006, Sh. 1
25203-LR26022, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-1, Main Steam.

The aging management review results for these components are provided in Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation.

2.3.4.2 EXTRACTION STEAM SYSTEM

System Description

The Extraction Steam System provides steam from the Main Steam System to the feedwater heaters to improve plant efficiency.

The Extraction Steam System is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Extraction Steam System can be found in the FSAR, Section 10.1, 10.2, and 10.4.1.

License Renewal Drawings

The license renewal drawings for the Extraction Steam System are listed below:

25203-LR26002, Sh. 1
25203-LR26002, Sh. 3
25203-LR26002, Sh. 4
25203-LR26003, Sh. 1
25203-LR26003, Sh. 2
25203-LR26004, Sh. 1
25203-LR26006, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-2, Extraction Steam.

The aging management review results for these components are provided in Table 3.4.2-2: Steam and Power Conversion System - Extraction Steam - Aging Management Evaluation.

2.3.4.3 FEEDWATER SYSTEM

System Description

The Feedwater System heats and supplies condensate-quality water to the secondary-side of the steam generators to support heat removal from the Reactor Coolant System. A portion of the system provides the flowpath for auxiliary feedwater flow to the steam generators.

The Feedwater System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a flow path for auxiliary feedwater to the steam generators, Containment pressure boundary integrity, and Regulatory Guide 1.97 safety-related indication. The Feedwater System meets 10CFR54.4(a)(2) because the system provides isolation of feed flow in the response to a main steam line break and the system contains non-safety-related 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 non-safety-related components credited with mitigating the effects of a high-energy line break. The system meets 10CFR54.4(a)(3) because the system includes EQ components and supports fire protection and station blackout.

The evaluation boundary begins at the feedwater pump suction and includes the feedwater piping, valves, and components in the flowpath to the steam generators. Also included in the evaluation boundary are non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Feedwater System can be found in the FSAR, Sections 4.3.2, 10.1, 10.4.5, and 14.8.2.1.4.

License Renewal Drawings

The license renewal drawings for the Feedwater System are listed below:

25203-LR26003, Sh. 1
25203-LR26003, Sh. 2
25203-LR26004, Sh. 3
25203-LR26005, Sh. 1
25203-LR26005, Sh. 2
25213-LR26807, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-3, Feedwater.

The aging management review results for these components are provided in Table 3.4.2-3: Steam and Power Conversion System - Feedwater - Aging Management Evaluation.

2.3.4.4 CONDENSATE SYSTEM

System Description

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 is in the scope of license renewal and meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Condensate System can be found in the FSAR, Sections 10.1, 10.4, and 14.8.2.1.4.

License Renewal Drawings

The license renewal drawings for the Condensate System are listed below:

25203-LR26003, Sh. 1
25203-LR26003, Sh. 2
25203-LR26004, Sh. 1
25203-LR26004, Sh. 2
25203-LR26004, Sh. 3
25203-LR26005, Sh. 1
25203-LR26005, Sh. 2
25203-LR26005, Sh. 3
25203-LR26006, Sh. 1
25203-LR26008, Sh. 1
25203-LR26012, Sh. 1
25203-LR26031, Sh. 1
25203-LR26031, Sh. 2
25213-LR26801, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-4, Condensate.

The aging management review results for these components are provided in Table 3.4.2-4: Steam and Power Conversion System - Condensate - Aging Management Evaluation.

2.3.4.5 CONDENSATE STORAGE AND TRANSFER SYSTEM

System Description

The Condensate Storage and Transfer System provides the missile-protected water source for the auxiliary feedwater pumps.

The Condensate Storage and Transfer System is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing a protected water source for the auxiliary feedwater pumps and Regulatory Guide 1.97 safety-related indication. The Condensate Storage and Transfer System meets 10CFR54.4(a)(2) because the system contains non-safety-related components credited with mitigating the effects of a high-energy line break. The system meets 10CFR54.4(a)(3) because the system supports fire protection and station blackout.

The evaluation boundary includes the condensate storage tank, the system components in the flowpath to the normally closed isolation valves for the condensate transfer pump and condenser hotwell makeup, and the system components in the flowpath to the auxiliary feedwater pumps.

FSAR References

Additional details of the Condensate Storage and Transfer System can be found in the FSAR, Section 10.1 and 10.4.5.

License Renewal Drawings

The license renewal drawings for the Condensate Storage and Transfer System are listed below:

25203-LR26005, Sh. 3
25203-LR26011, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-5, Condensate Storage and Transfer.

The aging management review results for these components are provided in Table 3.4.2-5: Steam and Power Conversion System - Condensate Storage and Transfer - Aging Management Evaluation.

2.3.4.6 CONDENSATE DEMIN MIXED BED SYSTEM

System Description

The Condensate Demin Mixed Bed System is used to maintain secondary system water chemistry.

The Condensate Demin Mixed Bed System is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Condensate Demin Mixed Bed System can be found in the FSAR, Section 10.1 and 10.4.5.

License Renewal Drawings

The license renewal drawing for the Condensate Demin Mixed Bed System is listed below:

25213-LR26801, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-6, Condensate Demin Mixed Bed.

The aging management review results for these components are provided in Table 3.4.2-6: Steam and Power Conversion System - Condensate Demin Mixed Bed - Aging Management Evaluation.

2.3.4.7 AUXILIARY FEEDWATER SYSTEM

System Description

The Auxiliary Feedwater System provides a supply of feedwater to the secondary-side of the steam generators for Reactor Coolant System 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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing feedwater to the steam generators for removal of sensible and decay heat from the Reactor Coolant System, isolation of auxiliary feedwater flow to a faulted or ruptured steam generator, auxiliary feedwater flow limitation to prevent pump runout, and Regulatory Guide 1.97 safety-related indication. The Auxiliary Feedwater System meets 10CFR54.4(a)(2) because the system contains non-safety-related components that mitigate the effects of a high-energy line break outside Containment. The system meets 10CFR54.4(a)(3) because the system includes EQ components and supports fire protection, anticipated transient without scram, and station blackout.

The evaluation boundary includes the entire Auxiliary Feedwater System.

FSAR References

Additional details of the Auxiliary Feedwater System can be found in the FSAR, Sections 7.9 and 10.4.5.

License Renewal Drawings

The license renewal drawings for the Auxiliary Feedwater System are listed below:

25203-LR26002, Sh. 1
25203-LR26005, Sh. 2
25203-LR26005, Sh. 3

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-7, Auxiliary Feedwater.

The aging management review results for these components are provided in Table 3.4.2-7: Steam and Power Conversion System - Auxiliary Feedwater - Aging Management Evaluation.

2.3.4.8 FEEDWATER HEATER VENTS AND DRAINS SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Feedwater Heater Vents and Drains System can be found in the FSAR, Section 10.1 and 10.4.5.

License Renewal Drawings

The license renewal drawings for the Feedwater Heater Vents and Drains System are listed below:

25203-LR26004, Sh. 1
25203-LR26004, Sh. 2

25203-LR26004, Sh. 3
25203-LR26005, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-8, Feedwater Heater Vents & Drains.

The aging management review results for these components are provided in Table 3.4.2-8: Steam and Power Conversion System - Feedwater Heater Vents & Drains - Aging Management Evaluation.

2.3.4.9 MOISTURE SEPARATION AND REHEAT SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Moisture Separation and Reheat System can be found in the FSAR, Section 10.1, 10.2, and 10.4.5.

License Renewal Drawings

The license renewal drawings for the Moisture Separation and Reheat System are listed below:

25203-LR26002, Sh. 3
25203-LR26002, Sh. 4
25203-LR26003, Sh. 1
25203-LR26003, Sh. 2
25203-LR26004, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-9, Moisture Separation & Reheat.

The aging management review results for these components are provided in Table 3.4.2-9: Steam and Power Conversion System - Moisture Separation & Reheat - Aging Management Evaluation.

2.3.4.10 PLANT HEATING AND CONDENSATE RECOVERY SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(1) by providing detection and isolation of a high-energy line break in the steam portion of the system and by providing a pressure boundary for the Reactor Building Closed Cooling Water System. The Plant Heating and Condensate Recovery System meets 10CFR54.4(a)(2) because the system contains non-safety-related 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 meets 10CFR54.4(a)(3) because the system contains EQ components and supports fire protection.

The evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building, Auxiliary Building, and Enclosure Building, components that isolate a high-energy line break in the steam portion of the system, and components that provide a pressure boundary at other system interfaces.

FSAR References

Additional details of the Plant Heating and Condensate Recovery System can be found in the FSAR, Section 9.13.2.

License Renewal Drawings

The license renewal drawings for the Plant Heating and Condensate Recovery System are listed below:

25203-LR26020, Sh. 4
25203-LR26022, Sh. 5
25203-LR26024, Sh. 3
25203-LR26026, Sh. 1

25203-LR26026, Sh. 2
25203-LR26026, Sh. 3
25203-LR26026, Sh. 5
25212-LR26970, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-10, Plant Heating & Condensate Recovery.

The aging management review results for these components are provided in Table 3.4.2-10: Steam and Power Conversion System - Plant Heating & Condensate Recovery - Aging Management Evaluation.

2.3.4.11 SECONDARY CHEMICAL FEED SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building and the Enclosure Building.

FSAR References

Additional details of the Secondary Chemical Feed System can be found in the FSAR, Section 10.4.5.

License Renewal Drawings

The license renewal drawings for the Secondary Chemical Feed System are listed below:

25203-LR26005, Sh. 2
25203-LR26031, Sh. 2

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-11, Secondary Chemical Feed.

The aging management review results for these components are provided in Table 3.4.2-11: Steam and Power Conversion System - Secondary Chemical Feed - Aging Management Evaluation.

2.3.4.12 TURBINE GLAND SEALING SYSTEM

System Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(2) since the system contains non-safety-related 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 evaluation boundary includes non-safety-related components with a spatial orientation near safety-related SSCs that are located in the Turbine Building.

FSAR References

Additional details of the Turbine Gland Sealing System can be found in the FSAR, Section 10.2 and 10.4.3.

License Renewal Drawings

The license renewal drawings for the Turbine Gland Sealing System are listed below:

25203-LR26005, Sh. 1
25203-LR26006, Sh. 1

Components Subject to AMR

The component groups that require aging management review are indicated in Table 2.3.4-12, Turbine Gland Sealing.

The aging management review results for these components are provided in Table 3.4.2-12: Steam and Power Conversion System - Turbine Gland Sealing - Aging Management Evaluation.

Screening Results Tables: Steam and Power Conversion Systems

See Table 2.0-1 for definition of intended function.

Table 2.3.4-1 Main Steam

Component Type	Intended Function(s)
Condensing Pots	Pressure Boundary
Expansion Joints	Limited Structural Integrity, Pressure Boundary
Flexible Hoses	Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Flow Orifices	Limited Structural Integrity, Pressure Boundary
Moisture Separators/Reheaters	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Quench Tank Heat Exchangers	Pressure Boundary
Silencers	Structural and/or functional support
Steam Traps	Limited Structural Integrity, Pressure Boundary
Strainers	Filtration, Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Turbine Casings	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-2 Extraction Steam

Component Type	Intended Function(s)
Expansion Joints	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Steam Traps	Limited Structural Integrity, Pressure Boundary
Strainers	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-3 Feedwater

Component Type	Intended Function(s)
Flow Elements	Pressure Boundary
Flow Orifices	Limited Structural Integrity, Pressure Boundary
Heaters	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-4 Condensate

Component Type	Intended Function(s)
Condensers	Limited Structural Integrity, Pressure Boundary
Drains Coolers	Limited Structural Integrity, Pressure Boundary
Expansion Joints	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Flow Orifices	Limited Structural Integrity, Pressure Boundary
Heat Exchanger Steam Jet Air Ejectors	Limited Structural Integrity, Pressure Boundary
Heaters	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Steam Packing Exhauster	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-5 Condensate Storage and Transfer

Component Type	Intended Function(s)
Condensate Storage Tank	Pressure Boundary
Pipe	Pressure Boundary
Rupture Disks	Pressure Boundary
Siphon Breaker	Restricts Flow
Tubing	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-6 Condensate Demin Mixed Bed

Component Type	Intended Function(s)
Pipe	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-7 Auxiliary Feedwater

Component Type	Intended Function(s)
Flow Elements	Pressure Boundary
Flow Orifices	Pressure Boundary, Restricts Flow
Pipe	Pressure Boundary
Pumps	Pressure Boundary
Tubing	Pressure Boundary
Turbine Casings	Pressure Boundary
Valves	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-8 Feedwater Heater Vents & Drains

Component Type	Intended Function(s)
Condensing Pots	Limited Structural Integrity, Pressure Boundary
Expansion Joints	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Flow Orifices	Limited Structural Integrity, Pressure Boundary
Gland Seal Coolers	Limited Structural Integrity, Pressure Boundary
Heater Drains Tank	Limited Structural Integrity, Pressure Boundary
Level Indicators	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Pumps	Limited Structural Integrity, Pressure Boundary
Restricting Orifices	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-9 Moisture Separation & Reheat

Component Type	Intended Function(s)
Condensing Pots	Limited Structural Integrity, Pressure Boundary
Drain Pots	Limited Structural Integrity, Pressure Boundary
Drain Tanks	Limited Structural Integrity, Pressure Boundary
Flow Elements	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-10 Plant Heating & Condensate Recovery

Component Type	Intended Function(s)
Heating and Ventilation Units	Limited Structural Integrity, Pressure Boundary
Heating Coils	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Reservoir	Limited Structural Integrity, Pressure Boundary
Sample Coolers	Pressure Boundary
Steam Traps	Limited Structural Integrity, Pressure Boundary
Strainers	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-11 Secondary Chemical Feed

Component Type	Intended Function(s)
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.3.4-12 Turbine Gland Sealing

Component Type	Intended Function(s)
Flow Orifices	Limited Structural Integrity, Pressure Boundary
Pipe	Limited Structural Integrity, Pressure Boundary
Tubing	Limited Structural Integrity, Pressure Boundary
Valves	Limited Structural Integrity, Pressure Boundary
Water Pot	Limited Structural Integrity, Pressure Boundary

See Table 2.0-1 for definition of intended function.

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

A listing of the abbreviations used in this section is provided in Section 1.4.

2.4.1 CONTAINMENT

Description

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 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 supports for the anchorages. The dome has a three-way post tensioning system. A continuous access gallery is provided beneath the foundation mat for installation and maintenance of vertical tendons.

Steel liners are attached to the inside of the Containment cylindrical wall, dome, and to the top of the foundation mat. The liner attachments to the concrete are Nelson anchors, cast in the Containment concrete as the concrete was poured against the liner. Individual liner plates are connected by full penetration welds to form a leak-tight barrier. With the exception of the Containment spray piping supports, steel insert plates are provided to transmit the load through the liner at each location where loads are transferred to the walls, slabs, or dome of the Containment, so that the Containment liner plate sees negligible stress due to the applied load.

The liner of the mat foundation is covered with a reinforced concrete slab to protect the liner from potential interior missiles. A moisture barrier is provided around the interface between the Containment cylindrical wall liner and the top of the concrete slab.

A maintenance truss is provided in the Containment for use in the maintenance of Containment spray piping and ease of inspection of the interior of the dome liner plate. It is supported at the top by a large pin embedded in the Containment dome. The bottom of the truss rests on the polar crane runway rail.

The Containment sump is formed by the floor at the lowest elevation of the Containment. The sump has an enclosure constructed of a stainless steel frame and galvanized grating to which a stainless steel wire cloth is attached. The screen assembly is divided into two sections separated by mesh and grating. The top of the sump enclosure is a solid stainless steel plate and each sump area is provided with a manway access and vent.

A reinforced concrete refueling cavity with a stainless steel liner is provided in the Containment for refueling. The normally dry refueling cavity forms a pool above the reactor vessel when it is filled with borated water for refueling. The reactor vessel flange is sealed to the bottom of the refueling cavity by the reactor cavity seal ring that prevents leakage of refueling water from the refueling cavity.

A neutron shield tank is installed during normal operations to reduce dose on the operating floor of the Containment. The neutron shield consists of 2 stainless steel semi-circular tanks containing de-mineralized water. When the two halves are joined in place, they form a collar at the reactor vessel head flange elevation and span the gap between the reactor vessel and the reactor cavity floor. Leakage could affect safety related equipment.

There are numerous penetrations through the Containment wall and liner that allow for transfer of personnel and equipment into and out of Containment, fuel transfer to and from the Containment, piping system passage through the Containment wall, and electrical service to equipment inside Containment. All penetrations form a part of the Containment pressure boundary. The Containment penetrations consist of the personnel lock, the equipment access opening, the fuel transfer tube assembly, mechanical penetrations, and electrical penetrations.

The personnel lock is a two-door access hatch assembly, 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.

The equipment access opening is a large single-door equipment hatch. It is fitted with a double-gasketed flange around the door to minimize leakage. The equipment access penetration is protected by a missile door.

The fuel transfer tube assembly consists of the fuel transfer tube installed inside a penetration sleeve that is welded to the Containment liner. The fuel transfer tube is fitted with a double-gasketed blind flange closure in the refueling pool and a gate valve in the transfer canal. A bellows expansion joint is installed in the sleeve to accommodate differential structure movement.

The mechanical piping penetrations include a penetration sleeve and a closure, consisting of modified pipe caps, double-flued heads, or closure plates, welded to the sleeve. The evaluation boundary of the mechanical piping penetration consists of the sleeve and the closure, out to the attachment weld(s) to the process piping. Spare mechanical penetrations are also part of the evaluation boundary. Process piping associated with mechanical penetrations is evaluated along with the host system.

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.

The Containment is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure. The Containment meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Containment also meets 10CFR54.4(a)(3) because the structure contains EQ equipment and supports fire protection.

FSAR Reference

Additional details of the Containment and Containment post-tensioning system can be found in the FSAR, Section 5.2.1 and 5.9.3.3.

Additional details of the personnel lock can be found in the FSAR, Figures 5.2-5 and 5.2-10.

Additional details of the equipment hatch can be found in the FSAR, Figures 5.2-4 and 5.2-10.

Additional details of the neutron shield tank and reactor cavity can be found in the FSAR, Sections 11.2.2.1 and 11.2.2.4, respectively.

Typical piping penetration arrangements are illustrated in FSAR Figure 5.2-8.

A list of Containment penetrations can be found in the FSAR, Table 5.2 - 11, Table 5.2 - 12, Table 5.2 - 13.

Additional details about the fuel transfer tube can be found in the FSAR, Section 5.2.7, 9.8.2.1.3, Figure 5.2-10 and Figure 9.8-10.

Components Subject to AMR

The Containment structural members that require aging management review are indicated in Table 2.4.1-1, Unit 2 Containment.

The aging management review results for these components are provided in Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation.

2.4.2 STRUCTURES AND COMPONENT SUPPORTS

2.4.2.1 UNIT 2 CONTAINMENT ENCLOSURE BUILDING

Description

The Unit 2 Containment Enclosure Building is a steel-framed structure, with metal siding and a roof deck. The Containment 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. The Containment Enclosure Building also encloses the Auxiliary Building equipment areas (the east and west main steam and main feedwater penetration areas).

The Unit 2 Containment Enclosure Building's steel-framed structure is supported partially on concrete grade beams and caissons, partially on the roof of the Auxiliary Building and Turbine Building, and partially on the dome of the Containment. The interior of the Containment Enclosure Building contains permanent ladders, stairways and platforms that allows for access to the upper exterior regions of the Containment and to equipment in the building. Doors allow for access into the building. The roof deck is supported by steel structural framing. The stack-support is installed on the roof's steel members. Steel roof scuppers are installed to control flooding in the event of heavy rainfall. Metal siding with seals is used to retain negative pressure within the Containment Enclosure Building and blow-off panels are installed to protect equipment within the Containment Enclosure Building from a high-energy line break.

The lower portion of the Containment Enclosure Building also provides protection from external flooding. Watertight doors and/or floodgates and flood/spill barriers are provided to protect the equipment from flooding.

The Containment Enclosure Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure. The Containment Enclosure Building meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Containment Enclosure Building also meets 10CFR54.4(a)(3) because the structure contains EQ equipment, and supports fire protection and station blackout.

FSAR Reference

Additional details of the Unit 2 Containment Enclosure Building can be found in the FSAR, Sections 1.2.6, 2.5.4, 2.7.5, 5.2, 5.3, 5.8.2, 5.9.3, and 14.8.4.

Components Subject to AMR

The Containment Enclosure Building structural members that require aging management review are indicated in Table 2.4.2-1, Unit 2 Containment Enclosure Building.

The aging management review results for these structural members are provided in Table 3.5.2-2: Structures and Component Supports - Unit 2 Containment Enclosure Building - Aging Management Evaluation.

2.4.2.2 UNIT 2 AUXILIARY BUILDING

Description

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 electrical equipment rooms (e.g., cable vault, switchgear rooms, etc.) are located within the Auxiliary Building structure and are bounded by concrete slabs and walls. Flood/spill barriers, watertight doors, and sumps are provided to protect equipment from internal and external flooding or spillage from tanks. The concrete walls, including masonry walls, provide fire, HELB, and EQ barriers.

Steel roof scuppers are installed to control flooding in the event of heavy rainfall.

The spent fuel pool receives spent fuel from the Containment through the fuel transfer tube. The fuel pool, including the transfer canal, consists of reinforced concrete walls and floor lined inside with stainless steel plates to the top of the fuel pool, to protect against loss of water. The liner plates are anchored to the concrete side with steel anchors, stiffeners, and other appurtenances. The transfer canal can be isolated from the rest of the spent fuel pool via movable stainless steel gates. Missile protection for the spent fuel pool is provided by concrete walls or missile proof siding.

The spent fuel storage racks are free-standing, seismically qualified, monolithic honeycomb structures that are submerged in treated water (borated water) in the spent fuel pool. Each rack is supported by adjustable pads to facilitate leveling at installation.

Some of the spent fuel racks contain a poison insert made up of Boraflex sheets that are enclosed in, but not sealed between, two stainless steel sheets.

The Unit 2 control room is located in the Unit 2 Auxiliary Building, adjacent to the Unit 1 control room. The Unit 2 control room is bounded by a concrete floor, concrete roof slabs, concrete walls at three sides, and a metal smoke barrier with glass panels separating the Unit 1 and Unit 2 control rooms. Fire-rated doors, fire barriers, and EQ barriers are provided in the control room. The control room has a suspended luminous ceiling of aluminum panels that are supported by steel framing.

The service water pipe tunnel is located in the Unit 2 Auxiliary Building below grade and runs under the south end of the Turbine Building. The tunnel is constructed of concrete slabs and walls.

Structural independence from surrounding buildings is provided by expansion joints/seismic gaps, slotted connections (sliding bearings), or Teflon-lined sliding bearings.

The Unit 2 Auxiliary Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure. The Unit 2 Auxiliary Building meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Unit 2 Auxiliary Building also meets 10CFR54.4(a)(3) because the structure contains EQ equipment and supports fire protection, station blackout, and anticipated transient without scram.

<u>FSAR Reference</u>

Additional details of the Unit 2 Auxiliary Building can be found in the FSAR, Sections 1.2.3, 1.2.10.4, 2.5.4.2.2, 2.7.5, 5.1.1, 5.4, 5.8.3, 9.8.2.1.2, and 14.7.4. General layout and various elevations are shown in Figure 1.2-7, Figure 1.2-8, and 1.2-14.

Additional details of the spent fuel pool and spent fuel storage racks can be found in the FSAR, in Sections 5.4.1.1.2, 5.4.3.3.5, 5.4.3.3.6, Figures 9.8.8A, 9.8.8C, and 5.2-10.

<u>Components Subject to AMR</u>

The Unit 2 Auxiliary Building structural members that require aging management review are indicated in Table 2.4.2-2, Unit 2 Auxiliary Building.

The aging management review results for these structural members are provided in Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation.

2.4.2.3 UNIT 2 WAREHOUSE BUILDING

Description

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.

Steel platforms, stairs, grating, ladders, and missile barriers are provided inside the Warehouse Building. The diesel oil supply tank rooms are located within the Warehouse Building and are bounded by concrete slabs and walls, and block walls. Flood/spill barriers and watertight doors are provided to protect equipment from internal and external flooding or spillage from tanks. The concrete walls, including masonry walls, provide fire and EQ barriers.

Steel roof scuppers are installed to control flooding in the event of heavy rainfall.

The concrete walls above the operating floor slab bound the new fuel storage room. The new fuel storage rack assemblies are anchored to the concrete floor slab.

The cask wash pit is bounded by the concrete walls above the foundation mat slab. The cask wash pit's walls and the foundation mat slab are lined with a stainless steel liner.

The emergency diesel generator rooms are bounded by the concrete walls above the foundation mat slab. Removable concrete block walls are provided at the east face of the rooms to facilitate the removal of the diesel generators. Metal siding covers the removable block walls.

A concrete pipe tunnel to the RWST is located below the warehouse building foundation mat slab.

The Unit 2 Warehouse Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure. The Unit 2 Warehouse Building meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Unit 2 Warehouse Building also meets 10CFR54.4(a)(3) because the structure contains EQ equipment and supports fire protection.

FSAR Reference

Additional details of the Unit 2 Warehouse Building can be found in the FSAR, Sections 2.7.5, 5.1.1, 5.4.1.1.1, and Figures 1.2-7, 1.2-8, and 1.2-9.

Components Subject to AMR

The Unit 2 Warehouse Building structural members that require aging management review are indicated in Table 2.4.2-3, Unit 2 Warehouse Building.

The aging management review results for these structural members are provided in Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation.

2.4.2.4 UNIT 2 TURBINE BUILDING

Description

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.

Steel platforms, stairs, grating, and ladders are provided inside the Turbine Building. Flood /spill barriers, watertight doors, and sumps (some with liners) are provided to protect equipment from internal and external flooding or spillage from tanks. The concrete walls, including masonry walls, and floors, including hatches, provide fire and EQ barriers.

The Unit 2 Turbine Building main structural frame is connected to the north side of the Unit 1 Turbine Building. The turbine-generator pedestal is founded on lean concrete backfill, which extends to bedrock. The pedestal is separated from the surrounding floor slabs by teflon lined sliding bearings.

Protection from external flooding is provided on the north and west sides by concrete walls and flood gates, and on the south side by the Unit 1 Turbine Building. Steel roof scuppers are installed to control flooding in the event of heavy rainfall.

The Unit 2 Turbine Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure. The Unit 2 Turbine Building meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Unit 2 Turbine Building also meets 10CFR54.4(a)(3) because the structure contains EQ equipment, and supports fire protection and station blackout.

FSAR Reference

Additional details of the Unit 2 Turbine Building can be found in the FSAR, Sections 1.2.3, 2.5.4.2, 5.1.1, 5.5, 10.4.5.3, Figures 1.2-3, 1.2-4, 1.2-5, 1.2-15, 1.2-16, 5.5-1 and 5.5-2.

Components Subject to AMR

The Unit 2 Turbine Building structural members that require aging management review are indicated in Table 2.4.2-4, Unit 2 Turbine Building.

The aging management review results for these structural members are provided in Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation.

2.4.2.5 UNIT 1 TURBINE BUILDING

Description

The Unit 1 Turbine Building has a reinforced concrete mat foundation supported on rolled structural steel H section bearing piles that were driven to bedrock. Reinforced concrete walls are provided to the operating floor. The remaining portions of the building have steel framing. The roof is covered with metal decking.

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 is connected to the Unit 2 Turbine Building by sliding bearings.

The Unit 1 Turbine Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because the Unit 1 Turbine Building provides support for the safety-related Unit 2 Turbine Building. The Unit 1 Turbine Building is in the scope of license renewal and meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure provide flood protection for the south side of the Unit 2 Turbine Building.

FSAR Reference

Additional details of the Unit 1 Turbine Building can be found in the FSAR, Sections 1.2.3 and 2.5.4.2.

Components Subject to AMR

The Unit 1 Turbine Building structural members that require aging management review are indicated in Table 2.4.2-5, Unit 1 Turbine Building.

The aging management review results for these structural members are provided in Table 3.5.2-6: Structures and Component Supports - Unit 1 Turbine Building - Aging Management Evaluation.

2.4.2.6 UNIT 1 CONTROL ROOM AND RADWASTE TREATMENT BUILDING

Description

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.

Unit 1 control room steel columns support the safety-related Unit 2 Auxiliary Building structure. The Unit 1 control room's peripheral walls, floor, and ceiling provide protection against internal and external hazards for the Unit 2 control room.

Structural independence from surrounding buildings is provided by sliding bearings, some that are Teflon-lined.

The Unit 1 Control Room and Radwaste Treatment Building is in the scope of license renewal and meets 10CFR54.4(a)(1) because 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 meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure provide flood protection. The Unit 1 Control Room and Radwaste Treatment Building also meets 10CFR54.4(a)(3) because the structure supports fire protection.

FSAR Reference

Additional details of the Unit 1 Control Room can be found in the FSAR, Sections 1.2.3 and 2.5.4.2.2.

Components Subject to AMR

The Unit 1 Control Room and Radwaste Treatment Building structural members that require aging management review are indicated in Table 2.4.2-6, Unit 1 Control Room and Radwaste Treatment Building.

The aging management review results for these structural members are provided in Table 3.5.2-7: Structures and Component Supports - Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation.

2.4.2.7 UNIT 2 FIRE PUMP HOUSE

The Unit 2 Fire Pump House is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting fire protection.

FSAR Reference

Additional details of the Unit 2 Fire Pump House can be found in the FSAR, Section 9.10.2.1.

Components Subject to AMR

The Unit 2 Fire Pump House structural members that require aging management review are indicated in Table 2.4.2-7, Unit 2 Fire Pump House.

The aging management review results for these structural members are provided in Table 3.5.2-8: Structures and Component Supports - Unit 2 Fire Pump House - Aging Management Evaluation.

2.4.2.8 UNIT 3 FIRE PUMP HOUSE

The Unit 3 Fire Pump House is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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.

Structural steel dike walls are provided on the floor around the diesel oil day tank to contain oil, should a leak occur.

The Unit 3 Fire Pump House is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting fire protection and station blackout.

FSAR Reference

Additional details of the Unit 3 Fire Pump House can be found in the FSAR, Section 9.10.2.1 and Figure 1.2-2.

Components Subject to AMR

The Unit 3 Fire Pump House structural members that require aging management review are indicated in Table 2.4.2-8, Unit 3 Fire Pump House.

The aging management review results for these structural members are provided in Table 3.5.2-9: Structures and Component Supports - Unit 3 Fire Pump House - Aging Management Evaluation.

2.4.2.9 SBO DIESEL GENERATOR ENCLOSURE AND FUEL OIL TANK VAULT

The SBO Diesel Generator Enclosure and Fuel Oil Tank Vault is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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 is located in a structure constructed of aluminum siding supported on aluminum framing, with an aluminum ceiling. The floor has steel framing and plating that rests on a concrete mat foundation. The associated SBO diesel generator switchgear enclosure has a concrete mat slab with a floor constructed of steel framing and plating, resting on the concrete mat foundation. The switchgear enclosure's siding and ceiling are constructed of aluminum siding, supported on aluminum framing.

The fuel oil tank vault is constructed of reinforced concrete floor and walls and has a metal ceiling.

The SBO Diesel Generator Enclosure and Fuel Oil Tank Vault is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting fire protection and station blackout.

FSAR Reference

Additional details of the SBO Diesel Generator Enclosure and Fuel Oil Tank Vault can be found in the Unit 3 FSAR, FPER Section 5, Analysis 91.

Components Subject to AMR

The SBO Diesel Generator Enclosure and Fuel Oil Tank Vault structural members that require aging management review are indicated in Table 2.4.2-9, SBO Diesel Generator Enclosure & Fuel Oil Tank Vault.

The aging management review results for these structural members are provided in Table 3.5.2-10: Structures and Component Supports - SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation.

2.4.2.10 UNIT 2 CONDENSATE POLISHING FACILITY AND WAREHOUSE NO. 5

The Unit 2 Condensate Polishing Facility and Warehouse No. 5 is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting station blackout and fire protection.

FSAR Reference

Additional details of the Unit 2 Condensate Polishing Facility and Warehouse No. 5 can be found in the FSAR, Figure 1.2-2 and Unit 3 Section 3.8.4.1.

Components Subject to AMR

The Unit 2 Condensate Polishing Facility and Warehouse No. 5 structural members that require aging management review are indicated in Table 2.4.2-10, Unit 2 Condensate Polishing Facility and Warehouse No. 5.

The aging management review results for these structural members are provided in Table 3.5.2-11: Structures and Component Supports - Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation.

2.4.2.11 SECURITY DIESEL GENERATOR ENCLOSURE

The Security Diesel Generator Enclosure is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting fire protection.

FSAR Reference

None

Components Subject to AMR

The Security Diesel Generator Enclosure structural members that require aging management review are indicated in Table 2.4.2-11, Security Diesel Generator Enclosure.

The aging management review results for these structural members are provided in Table 3.5.2-12: Structures and Component Supports - Security Diesel Generator Enclosure - Aging Management Evaluation.

2.4.2.12 STACK MONITORING EQUIPMENT BUILDING

The Stack Monitoring Equipment Building is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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 is in the scope of license renewal because it meets 10CFR54.4(a)(2) since non-safety-related structural members within the structure support the function of safety-related equipment.

FSAR Reference

None

Components Subject to AMR

The Stack Monitoring Equipment Building structural members that require aging management review are indicated in Table 2.4.2-12, Stack Monitoring Equipment Building.

The aging management review results for these structural members are provided in Table 3.5.2-13: Structures and Component Supports - Stack Monitoring Equipment Building - Aging Management Evaluation.

2.4.2.13 MILLSTONE STACK

The Millstone Stack is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

The Millstone Stack is a safety-related reinforced-concrete structure supported on a reinforced concrete mat foundation. The Millstone Stack extends 375 feet above grade and has a circular orifice with a 7 foot inside diameter.

The Millstone Stack provides a release path for Unit 2 and Unit 3 ventilation discharge piping. The ventilation discharge piping from the Unit 2 Enclosure Building Filtration System and the Unit 3 Supplementary Leak Collection and Release System enter the

Millstone Stack below grade. These pipes extend through the concrete floor slab at grade elevation and rise through the steel floor deck that is supported by steel beams. The pipes extend above the top of the floor deck.

The Millstone Stack is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure.

FSAR Reference

Additional details of the Millstone Stack can be found in the Unit 3 FSAR, Section 11.3.3.

Components Subject to AMR

The Millstone Stack structural members that require aging management review are indicated in Table 2.4.2-13, Millstone Stack.

The aging management review results for these structural members are provided in Table 3.5.2-14: Structures and Component Supports - Millstone Stack - Aging Management Evaluation

2.4.2.14 SWITCHYARD CONTROL HOUSE

The Switchyard Control House is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

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.

Some parts of the building are supported on a concrete mat slab and some parts have a concrete slab on grade with exterior wall supported on a concrete footing. Exterior masonry walls and steel beams support the metal deck roof. The top of the metal deck roof has a concrete slab.

The Switchyard Control House is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting station blackout.

FSAR Reference

None

Components Subject to AMR

The Switchyard Control House structural members that require aging management review are indicated in Table 2.4.2-14, Switchyard Control House.

The aging management review results for these structural members are provided in Table 3.5.2-15: Structures and Component Supports - Switchyard Control House - Aging Management Evaluation.

2.4.2.15 RETAINING WALL

Description

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 Number 5.

The evaluation boundary consists of the portion of the retaining wall which supports the SBO power feed that comes from Unit 3 to Unit 2.

The retaining wall is in the scope of license renewal because it meets 10CFR54.4(a)(3) by supporting station blackout.

FSAR Reference

None

Components Subject to AMR

The retaining wall structural member that requires aging management review is indicated in Table 2.4.2-15, Retaining Wall.

The aging management review results for this structural member are provided in Table 3.5.2-16: Structures and Component Supports - Retaining Wall - Aging Management Evaluation.

2.4.2.16 345kV SWITCHYARD

The 345kV Switchyard is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

Description

Structural members associated with the in-scope electrical equipment required for the restoration of offsite power includes 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 structures and structural members are in the scope of license renewal because they meet 10CFR54.4(a)(3) by supporting station blackout.

FSAR Reference

None

Components Subject to AMR

The 345kV Switchyard structural members that require aging management review are indicated in Table 2.4.2-16, 345kV Switchyard.

The aging management review results for these structural members are provided in Table 3.5.2-17: Structures and Component Supports - 345kV Switchyard - Aging Management Evaluation.

2.4.2.17 UNIT 2 INTAKE STRUCTURE

Description

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 System is the only safety-related system located in the Unit 2 Intake Structure.

The water that is withdrawn from the Niantic Bay passes through trash racks and traveling water screens, before reaching the circulating and service water pumps. The trash racks are associated with the safety-related Service Water System and therefore, are within the scope of license renewal. The traveling screens are not in the scope of license renewal because they do not perform an intended function.

The Unit 2 Intake Structure is supported by a reinforced concrete mat foundation founded on bedrock. A concrete operating floor is located at approximately grade elevation.

The roof of the Unit 2 Intake Structure consists of concrete supported by steel roof decking and steel beams. Steel and concrete roof hatches are provided for equipment removal and installation. The steel hatches installed over the circulating water pumps and the traveling water screens also serve as blowout panels under tornado conditions to relieve the pressure differential.

The external concrete walls provide tornado missile protection for the safety-related equipment inside the Unit 2 Intake Structure. The Unit 2 Intake Structure's air louvers on the west wall are also missile protected. Other openings in the Unit 2 Intake Structure, such as access doors and equipment access hatches in the roof are not missile resistant or protected. These openings have been evaluated analytically to demonstrate that the equipment and building layout will prevent tornado missiles from affecting the safety-related functions.

The Unit 2 Intake Structure is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I (service water cubicles only) structure that provides a source of cooling water to the safety-related Service Water pumps. The Unit 2 Intake Structure meets 10CFR54.4(a)(2) because non-safety-related structural members within the structure support the function of safety-related equipment. The Unit 2 Intake Structure also meets 10CFR54.4(a)(3) because the structure supports fire protection and station blackout.

FSAR Reference

Additional details of the Unit 2 Intake Structure can be found in the FSAR, Sections 5.6 and 9.7.2.4.

Components Subject to AMR

The Unit 2 Intake Structure structural members that require aging management review are indicated in Table 2.4.2-17, Unit 2 Intake Structure.

The aging management review results for these structural members are provided in Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation.

2.4.2.18 SEA WALLS

Description

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 ft. above mean sea level.

The concrete sea walls are in the scope of license renewal because they are safety-related structures that meet 10CFR54.4(a)(1) by protecting the structural integrity of the safety-related Unit 2 Intake Structure.

FSAR Reference

Additional details of the sea walls can be found in the FSAR, Section 2.5.4.2.1, and Figures 2.5-12 and 2.5-15.

Components Subject to AMR

The sea walls structural members that require aging management review are indicated in Table 2.4.2-18, Sea Walls.

The aging management review results for these structural members are provided in Table 3.5.2-19: Structures and Component Supports - Sea Walls - Aging Management Evaluation.

2.4.2.19 UNIT 2 DISCHARGE TUNNEL AND DISCHARGE STRUCTURE

Description

The Service Water 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, service water 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 in the scope of license renewal for 10CFR54.4(a)(2) since they are non-safety-related structures whose failure could affect the discharge path for the safety-related Service Water System.

FSAR Reference

Additional details of the Unit 2 Discharge Tunnel and Discharge Structure can be found in the FSAR, Figure 5.6-2.

Components Subject to AMR

The Unit 2 discharge tunnel and discharge structure structural member that requires aging management review is indicated in Table 2.4.2-19, Unit 2 Discharge Tunnel and Discharge Structure.

The aging management review results for this structural member are provided in Table 3.5.2-20: Structures and Component Supports - Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation.

2.4.2.20 UNIT 2 BYPASS LINE

Description

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 bypass line is a precast concrete pipe that is reinforced with both circumferential and longitudinal steel. The concrete pipe is provided with bell and spigot ends formed by steel joint rings securely fastened in the pipe wall.

The Unit 2 bypass line is in the scope of license renewal and meets 10CFR54.4(a)(2) because it 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 Service Water System.

FSAR Reference

Additional details of the Unit 2 bypass line can be found in the FSAR, Sections 2.5.4.3, and 9.7, and Figure 5.6-2.

Components Subject to AMR

The Unit 2 bypass line structural members that require aging management review are indicated in Table 2.4.2-20, Unit 2 Bypass Line.

The aging management review results for these structural members are provided in Table 3.5.2-21: Structures and Component Supports - Unit 2 Bypass Line - Aging Management Evaluation.

2.4.2.21 TANK FOUNDATIONS

Description

The following foundations are in the scope of license renewal and are addressed in this section:

- 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

Unit 2 Condensate Storage Tank Foundation and Missile Barrier

The Unit 2 condensate storage tank is supported on a reinforced concrete mat foundation, which rests on compacted structural backfill. A concrete wall surrounds the tank. The concrete walls are anchored to the concrete foundation with steel brackets.

The Unit 2 Condensate Storage Tank Foundation and Missile Barrier is in the scope of license renewal because the structure meets 10CFR54.4(a)(1) by providing support for the safety-related condensate storage tank.

Fire Water Tanks 1 and 2 Foundations

The fire water tanks 1 and 2 Foundations are shared structures that provide intended functions for both Millstone Unit 2 and Millstone Unit 3. Since these are shared structures, this section is duplicated in the Millstone Unit 3 license renewal application.

The fire water tanks 1 and 2 are located on the west side of the Fire Pump Houses and supply water to the fire water pumps. The tanks are supported on a 4-inch sand cushion placed on compacted soil. Steel brackets welded to the tank shell are used to anchor the tanks to a concrete footing placed around the tank.

The Fire Water Tanks 1 and 2 foundations are in the scope of license renewal because they meet 10CFR54.4(a)(3) by supporting fire protection.

Unit 2 Diesel Fuel Oil Storage Tank Foundation

The Unit 2 diesel fuel oil storage tank provides fuel oil to the emergency diesel generators. The tank is supported on, and anchored to, a reinforced concrete pad.

The Unit 2 Diesel Fuel Oil Storage Tank Foundation is in the scope of license renewal because the structure meets 10CFR54.4(a)(2) by supporting the in-scope diesel fuel oil storage tank.

Unit 2 Refueling Water Storage Tank Foundation

The Unit 2 refueling water storage tank is a 450,000 gallon tank supported on a reinforced concrete mat foundation that is resting on compacted structural backfill.

The Unit 2 Refueling Water Storage Tank Foundation is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure.

SBO Diesel Fuel Oil Storage Tank Foundation

The SBO Diesel Fuel Oil Storage Tank Foundation is a shared structure that provides intended functions for both Millstone Unit 2 and Millstone Unit 3. Since this is a shared structure, this section is duplicated in the Millstone Unit 3 license renewal application.

This SBO diesel fuel oil storage tank supplies fuel oil to the SBO diesel generator. The tank is located to the south of the SBO diesel generator enclosure and fuel oil tank vault. The tank is supported on a concrete pad and anchored to the foundation.

The SBO Diesel Fuel Oil Storage Tank Foundation is in the scope of license renewal because the structure meets 10CFR54.4(a)(3) by supporting fire protection and station blackout.

FSAR Reference

Additional details of tank foundations can be found in the following FSAR Sections:

Unit 2 Condensate Storage Tank Foundation and Missile Barrier - Sections 5.7.1, 5.7.3.1.4, 10.4.5.3, and Figure 1.2-2

Fire Water Tanks 1 and 2 Foundations - Unit 3 FSAR FPER Section 4.1.1

Unit 2 Refueling Water Storage Tank Foundation - Section 5.7.1 and Figure 1.2-2

Components Subject to AMR

The tank foundations structural members that require aging management review are provided in Table 2.4.2-21, Tank Foundations.

The aging management review results for these structural members are provided in Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation.

2.4.2.22 YARD STRUCTURES

Description

The following yard structures are in the scope of license renewal and addressed in this section:

- Unit 2 Transformer Firewalls and Dikes
- A700 Switchgear Enclosure Dike
- Unit 2 Diesel Fuel Oil Storage Tank Dike
- Unit 2 RWST Valve Pit
- Unit 2 Pipe Trenches
- Unit 2 Manholes
- Unit 2 Duct Banks
- Unit 2 Security Lighting Supports (including poles)

Unit 2 Transformer Firewalls and Dikes

The Unit 2 transformer yard contains the main, normal station service, and reserve station service transformers. A concrete containment dike and sump is installed for each. The main and reserve station service transformers are separated by a concrete firewall. There is no firewall between the main transformer and the normal station service transformer.

The Unit 2 Transformer Firewalls and Dikes are in the scope of license renewal because these structures meet 10CFR54.4(a)(3) by supporting fire protection.

A700 Switchgear Enclosure Dike

The A700 Switchgear Enclosure is located near the reserve station service transformer. The A700 Switchgear Enclosure is surrounded by a reinforced concrete dike with a watertight door for flood protection. The A700 switchgear is required for restoration of offsite power following a station blackout event.

The A700 Switchgear Enclosure Dike is in the scope of license renewal because the structure meets 10CFR54.4(a)(3) by supporting station blackout.

Unit 2 Diesel Fuel Oil Storage Tank Dike

The Unit 2 Diesel Fuel Oil Storage Tank is surrounded by a carbon steel dike to contain fuel oil to prevent the spread of flammable material in the event of a breach of the fuel oil tank.

The Unit 2 Diesel Fuel Oil Storage Tank Dike is in the scope of license renewal because the structure meets 10CFR54.4(a)(3) by supporting fire protection.

Unit 2 RWST Valve Pit

A reinforced concrete valve enclosure structure is installed at the RWST. The safety-related structure provides enclosure, protection, and access to valves and pipes between the RWST and the pipe trench. Steel manway covers are provided for the access openings.

The Unit 2 RWST Valve Pit is in the scope of license renewal and meets 10CFR54.4(a)(1) because it is a Class I structure that provides enclosure and protection for safety-related piping associated with the RWST.

Unit 2 Pipe Trenches

The concrete pipe trenches within the scope of license renewal are constructed of reinforced concrete. The pipe trench from the Condensate Storage Tank to the Turbine Building protects the condensate pipe from the storage tank to the auxiliary feedwater pumps. This trench has removable concrete hatch cover sections with carbon steel lifting eyes on each hatch cover section. A reinforced concrete pipe trench is also installed from the RWST valve pit to the Warehouse Building.

These pipe trenches are in the scope of license renewal and meet 10CFR54.4(a)(1) because they provide protection for safety-related condensate pipe from the storage tank to the auxiliary feedwater pumps. These pipe trenches also meet 10CFR54.4(a)(3) by supporting fire protection and station blackout.

Unit 2 Manholes

The manholes that are in the scope of license renewal contain electrical cables for in-scope equipment. They are reinforced concrete structures and are soil supported, except for two manholes located at the NE and SE corners of the Unit 2 Intake Structure's east exterior wall. These manholes extend above grade and are supported on rock. Removable covers allow for access to cables and some covers provide missile protection.

The Unit 2 manholes are in the scope of license renewal and meet 10CFR54.4(a)(1) because they contain electrical cables for safety-related in-scope equipment. Other in-scope manholes meet 10CFR54.4(a)(3) because they support fire protection.

Unit 2 Duct Banks

The concrete duct banks within the scope of license renewal are constructed of reinforced concrete and are soil supported.

The Unit 2 duct banks are in the scope of license renewal and meet 10CFR54.4(a)(1) because they support and protect electrical cables for safety-related in-scope equipment. Other duct banks meet 10CFR54.4(a)(3) because they support fire protection and station blackout.

Unit 2 Security Lighting Supports (including poles)

Operator access routes to the various components that are required for fire protection may require travel through the yard area to other buildings or structures. Lighting for these exterior routes is provided by the station's security perimeter lighting system, which is installed on the exterior of buildings and on aluminum poles.

The Unit 2 Security Lighting Supports (including poles) are in the scope of license renewal because they meet 10CFR54.4(a)(3) by supporting fire protection.

FSAR Reference

Additional details of the Unit 2 Transformer Firewalls and Dikes can be found in the FSAR, Section 8.2.4 and Figure 1.2-2.

Components Subject to AMR

The yard structures structural members that require aging management review are provided in Table 2.4.2-22, Yard Structures

The aging management review results for these structural members are provided in Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation.

2.4.3 NSSS EQUIPMENT SUPPORTS

Description

The NSSS equipment supports are the plant structures and components that support and restrain the following reactor coolant system equipment:

- Reactor vessel
- Reactor coolant pumps
- Steam generators
- Pressurizer

These support elements are evaluated as follows:

Specifically,

- Pins, bolting, and other removable hardware that are part of the connection to the NSSS equipment integral attachment have been evaluated with the NSSS equipment supports.
- Exposed portions of the embedded components (i.e. end portion of threaded anchor and nut) are evaluated with the NSSS equipment supports.
- Concrete supporting structures (including the embedded portion of threaded anchor) are evaluated with the Containment (The Containment is addressed in Section 2.4.1, Containment).
- Integral attachments for the NSSS equipment are evaluated for aging management with the specific NSSS equipment (The following sections address this equipment: Section 2.3.1.1, Reactor Vessel; Section 2.3.1.2, Reactor Vessel Internals; Section 2.3.1.3, Reactor Coolant System, which includes the Pressurizer).

The NSSS equipment supports are in the scope of license renewal and meet 10CFR54.4(a)(1) because they support safety-related RCS components.

Reactor Vessel Support

Support for the reactor vessel is provided by three reactor coolant piping nozzles (one outlet nozzle and two inlet nozzles) through sliding support assemblies that are attached to the Containment concrete structure. The reactor vessel sliding support assembly consists of permanently lubricated expansion plates and shim plates that permit linear movement and a slide-and-socket arrangement that permits rotational movement. The support also includes structural steel plates and shapes, and anchorage and assembly bolting.

Reactor Coolant Pump Supports

Each reactor coolant pump and motor are supported by four spring hanger assemblies attached to support lugs welded to the pump volute and supported on steel brackets that are embedded in the pump cubicle wall concrete. Movement in the horizontal plane to compensate for pump thermal growth and contraction is permitted by the support arrangement. Vertical movement is not restrained.

The spring hanger assembly consists of a casing and spring, end connection rod, and rocking base and head connection. The spring hanger assembly is supported by structural steel plates and shapes that are welded to steel beams, which are partially embedded in the pump cubicle concrete wall.

Steam Generator Supports

The steam generators are vertically mounted on bearing plates, which allow lateral motion due to thermal expansion of the reactor coolant piping. Stops are provided to limit this motion in case of a coolant pipe rupture. The top of each steam generator is restrained from sudden lateral movement by stops and hydraulic snubbers mounted rigidly to the concrete structure.

The steam generator base support consists of a sliding base casting bolted to the steam generator integral support skirt. Four slide-and-socket assemblies are mounted to the bottom of the sliding base casting. The slide-and-socket assemblies slide on baseplates mounted to a concrete-embedded steel sub-structure.

The steam generator upper shell support system consists of a lateral support arrangement with hydraulic snubbers and a rotational shear key support arrangement. The snubber support system consists of integral steam generator attachment clevises, steam generator cubicle wall structure attachment clevises, pins, structural steel, and anchor bolts.

The shear key support consists of integral steam generator anti-rotation key lugs with keyways formed by structural steel weldments embedded in SG cubicle concrete walls. The keyway includes permanently lubricated shim plates that allow vertical movement of the steam generator to accommodate thermal growth.

Pressurizer Support

The pressurizer is supported by a cylindrical support skirt welded to the lower vessel head and bolted rigidly to the concrete floor.

FSAR Reference

Additional details of the reactor coolant equipment supports can be found in the following FSAR sections:

Reactor vessel supports - Section 4.3.1 and Figure 5.2-11

Reactor coolant pump supports - Section 4.3.3

Steam generator supports - Section 4.3.2 and Figure 4.3-2

Pressurizer support - Section 4.3.5 and Figure 4.3-7

Components Subject to AMR

The NSSS equipment supports component types that require aging management review are indicated in Table 2.4.2-23, NSSS Equipment Supports.

The aging management review results for these component types are provided in Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation.

2.4.4 GENERAL STRUCTURAL SUPPORTS

Description

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.

The commodity evaluation applies to structural supports within the structures identified in Table 2.2-3, Structures Within the Scope of License Renewal. Major primary system component supports are addressed in Section 2.4.3, NSSS Equipment Supports. The remaining structural supports are addressed in this section, including supports for the following equipment:

- Mechanical equipment (pumps, tanks, fans, heat exchangers, gas bottles, etc.)
- Electrical and I&C equipment (cabinets, panels, junction boxes, batteries, etc.)
- Piping (including whip restraints)
- Tubing
- Ducting
- Cable trays and electrical conduit
- Miscellaneous components (tool boxes, ladders, fire hose racks)

- Miscellaneous load handling devices that are not identified in Section 2.4.6, Load Handling Cranes and Devices

In addition cable trays, conduits, instrument racks, frames and vibration isolators are addressed in this section.

Some equipment is restrained or supported to prevent interaction with safety-related equipment. Although this equipment may not be included within the scope of license renewal, the structural supports for the equipment are included in-scope and are subject to aging management review.

Structural supports are in the scope of license renewal because they support and protect equipment that is within the scope of license renewal. Safety-related supports meet 10CFR54.4(a)(1). Non-safety-related supports meet 10CFR54.4(a)(2) when they prevent interaction between safety-related and non-safety-related components. Other supports meet 10CFR54.4(a)(3) because they provide support for components credited for fire protection, station blackout, anticipated transient without scram, pressurized thermal shock, or environmental qualification of electrical equipment.

The evaluation boundary for structural supports lies between the equipment or component being supported and the building supporting structure (concrete or structural steel). Integral attachments and welds to pressure retaining components are considered part of the component and are addressed with the specific component in other sections of this application. In addition, embedded steel support attachments are addressed with the associated building structure.

<u>FSAR Reference</u>

None

<u>Components Subject to AMR</u>

The General Structural Supports structural members that require aging management review are indicated in Table 2.4.2-24, General Structural Supports.

The aging management review results for these structural members are provided in Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation.

2.4.5 MISCELLANEOUS STRUCTURAL COMMODITIES

<u>Description</u>

Screening of certain miscellaneous plant items was performed on a commodity group basis. These commodities were identified as in scope based on their location within structures that are in scope as defined in Table 2.2-3, Structures Within the Scope of License Renewal.

The miscellaneous structural commodities include items such as the following:

- Fire/EQ barriers including doors, penetration seals, fire-resistant coatings, cable wraps, radiant energy shields, cable tray covers, fire stops, fire boots, enclosures, and gypsum boards.
- Flood barriers including flood prevention plugs, flood doors/gates, stop logs, watertight doors
- Expansion joint/seismic gap materials
- Electrical items such as electrical panels and cabinets, junction boxes, terminal and pull boxes, and enclosures for bus duct and switchgear. The electrical panels and cabinets contain supports for electrical components located inside the enclosure. Gaskets provide a leaktight condition from weather for the junction, terminal, and pull boxes.

Miscellaneous structural commodities are in the scope of license renewal because they meet 10CFR54.4(a)(1) by providing safety-related functions, 10CFR54.4(a)(2) by supporting safety-related component functions, and/or 10CFR54.4(a)(3) by supporting environmental qualification, fire protection, station blackout, anticipated transient without scram, and pressurized thermal shock regulations.

FSAR Reference

None

Components Subject to AMR

The commodity groups included in the Miscellaneous Structural Commodities that require aging management review are indicated in Table 2.4.2-25, Miscellaneous Structural Commodities.

The aging management review results for these commodity groups are provided in Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation.

2.4.6 LOAD HANDLING CRANES AND DEVICES

Description

Load handling cranes and devices are designed for lifting, transporting and handling loads. The load handling cranes and devices within the scope of license renewal are listed below:

- Containment polar crane
- Spent fuel cask crane
- Spent fuel platform crane
- New fuel elevator
- Refueling machine
- Fuel transfer machine
- Fuel tilting mechanisms
- Monorails, which include:
  - The Reactor Building component cooling water heat exchanger monorail
  - The A diesel generator room monorail
  - Process computer monorail

The elements of the load handling cranes and devices that are subject to aging management review are limited to those load-bearing elements that support the lift in a passive manner. This includes the structural elements that support a load during a lift, such as girders, structural support members, rails/tracks, and anchorage for support members.

The load handling cranes and devices are in the scope of license renewal because certain load handling cranes and devices are Seismic Class I and meet 10CFR54.4(a)(1), or are seismically designed and meet 10CFR54.4(a)(2) to ensure that they will not adversely impact safety-related components during or subsequent to a seismic event.

The evaluation boundary for the load handling cranes and devices includes the in-scope crane passive structural members.

FSAR Reference

Additional details of load handling cranes and devices can be found in the FSAR, Sections 5.2.6.4, 9.8, Table 1.4 - 1, and Figure 9.8-17.

Components Subject to AMR

The load handling cranes and devices structural members that require aging management review are indicated in Table 2.4.2-26, Load Handling Cranes and Devices.

The aging management review results for these structural members are provided in Table 3.5.2-27: Structures and Component Supports - Load Handling Cranes and Devices - Aging Management Evaluation.

Screening Results Tables: Structures

See Table 2.0-1 for definition of intended function.

Table 2.4.1-1 Unit 2 Containment

Structural Member	Intended Function(s)
Containment liner	Pressure Boundary, Structural Support [Criterion (a)(1)]
Containment Shell (cylindrical wall and dome)	Pressure Boundary, Structural Support [Criterion (a)(1)], Enclosure Protection, Fire Barrier, Missile Barrier, EQ Barrier
Containment Sump Screen	Structural Support [Criterion (a)(1)]
Door locking mechanism	Pressure Boundary, Structural Support [Criterion (a)(1)]
Electrical Penetrations	Pressure Boundary, Structural Support [Criterion (a)(1)]
Equipment hatch	Pressure Boundary, Structural Support [Criterion (a)(1)], Fire Barrier
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Expansion Bellows	Pressure Boundary
Fuel transfer tube	Pressure Boundary, Structural Support [Criterion (a)(1)]
Fuel transfer tube gate valve	Pressure Boundary, Structural Support [Criterion (a)(1)]
Fuel Transfer Tube Penetration	Pressure Boundary, Structural Support [Criterion (a)(1)]
Gaskets	Pressure Boundary, Structural Support [Criterion (a)(1)]
Hinges and Pins	Pressure Boundary, Structural Support [Criterion (a)(1)]
Jet impingement barriers	Jet Impingement Shield

See Table 2.0-1 for definition of intended function.

Table 2.4.1-1 Unit 2 Containment

Structural Member	Intended Function(s)
Mechanical Penetrations	Pressure Boundary, Structural Support [Criterion (a)(1)]
Miscellaneous Steel (Brackets, Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Missile barriers	Structural Support [Criterion (a)(1)], Missile Barrier
Moisture Barrier	Structural Support [Criteria (a)(2) & (a)(3)]
Neutron Shield Tank	Structural Support [Criteria (a)(2) & (a)(3)]
O-Rings	Pressure Boundary, Structural Support [Criterion (a)(1)]
Personnel Lock	Pressure Boundary, Structural Support [Criterion (a)(1)]
Pipe	Pressure Boundary
Primary Shield Wall Plate	Structural Support [Criterion (a)(1)]
Reactor cavity seal ring	Pressure Boundary, Structural Support [Criterion (a)(1)]
Refueling cavity liner	Pressure Boundary, Structural Support [Criterion (a)(1)]
Spare Penetrations	Pressure Boundary
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Pedestals, Walls)	Structural Support [Criterion (a)(1)], Enclosure Protection, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Jet Impingement Shield

See Table 2.0-1 for definition of intended function.

Table 2.4.1-1 Unit 2 Containment

Structural Member	Intended Function(s)
Structural Steel (Beams, Bracing, Columns and baseplates, Trusses)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Tendon Anchorages	Pressure Boundary, Structural Support [Criterion (a)(1)]
Tendon Gallery	Structural Support [Criterion (a)(1)]
Tendon Wires	Pressure Boundary, Structural Support [Criterion (a)(1)]
Valve bodies	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.4.2-1 Unit 2 Containment Enclosure Building

Structural Member	Intended Function(s)
Blow-off metal siding/ Panel	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Doors	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Metal siding	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Metal siding-caulking	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Scuppers	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Caisson, Floor slabs, Grade Beams, Slabs on grade, Walls)	Structural Support [Criterion (a)(1)], Enclosure Protection, Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	Structural Support [Criterion (a)(1)], Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Vent stacks (supports)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-2 Unit 2 Auxiliary Building

Structural Member	Intended Function(s)
Control room ceiling panels	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Control room ceiling supports	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Doors	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)], Jet Impingement Shield
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Masonry block walls	Structural Support [Criterion (a)(1)], Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Metal siding	Enclosure Protection, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Metal Smoke Barrier	Pressure Boundary, Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Neutron absorber elements	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-2 Unit 2 Auxiliary Building

Structural Member	Intended Function(s)
Scuppers	Structural Support [Criteria (a)(2) & (a)(3)]
Sliding Bearings	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Spent Fuel Pool Gate	Pressure Boundary, Structural Support [Criterion (a)(1)]
Spent Fuel Pool Gate-Seal	Pressure Boundary, Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Spent fuel pool liner plates	Pressure Boundary, Structural Support [Criterion (a)(1)]
Spent fuel storage racks	Structural Support [Criterion (a)(1)]
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Slabs on grade, Walls)	Pressure Boundary, Structural Support [Criterion (a)(1)], Enclosure Protection, Fire Barrier, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier, Jet Impingement Shield, EQ Barrier
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	Structural Support [Criterion (a)(1)], Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Sumps	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Tunnel	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Jet Impingement Shield

See Table 2.0-1 for definition of intended function.

Table 2.4.2-3 Unit 2 Warehouse Building

Structural Member	Intended Function(s)
Cask Wash Pit Liner	Structural Support [Criterion (a)(1)], Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Doors	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Masonry block walls	Structural Support [Criterion (a)(1)], Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Metal siding	Enclosure Protection, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Missile barriers	Structural Support [Criterion (a)(1)], Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
New fuel racks assembly	Structural Support [Criterion (a)(1)]
Scuppers	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-3   Unit 2 Warehouse Building

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	Structural Support [Criterion (a)(1)], Enclosure Protection, Fire Barrier, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier, EQ Barrier
Structural Steel (Beams, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Tunnel	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-4 Unit 2 Turbine Building

Structural Member	Intended Function(s)
Blow-off metal siding/ Panel	Structural Support [Criterion (a)(1)], Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Doors	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)], Jet Impingement Shield
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Hatches	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Jet Impingement Shield
Masonry block walls	Structural Support [Criterion (a)(1)], Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Metal siding	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Metal siding-caulking	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Brackets, Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Scuppers	Structural Support [Criteria (a)(2) & (a)(3)]
Sliding Bearings	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-4 Unit 2 Turbine Building

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Floor slabs, Footing and grade beams, Grade Beams, Pedestals, Roof slabs, Slabs on grade, Spread footing, Turbine Pedestal, Walls)	Structural Support [Criterion (a)(1)], Enclosure Protection, Fire Barrier, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier, Jet Impingement Shield, EQ Barrier
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Sump Liner	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Sumps	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier

See Table 2.0-1 for definition of intended function.

Table 2.4.2-5 Unit 1 Turbine Building

Structural Member	Intended Function(s)
H-Piles	Structural Support [Criteria (a)(2) & (a)(3)]
Scuppers	Structural Support [Criteria (a)(2) & (a)(3)]
Sliding Bearings	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	Enclosure Protection, Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-6 Unit 1 Control Room and Radwaste Treatment Building

Structural Member	Intended Function(s)
Miscellaneous Steel (Brackets, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	Structural Support [Criteria (a)(2) & (a)(3)]
Sliding Bearings	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	Enclosure Protection, Fire Barrier, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Steel (Beams, Columns and baseplates)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-7 Unit 2 Fire Pump House

Structural Member	Intended Function(s)
Equipment pads / grout	Structural Support [Criteria (a)(2) & (a)(3)]
Masonry block walls	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Roof framing and decking)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-8 Unit 3 Fire Pump House

Structural Member	Intended Function(s)
Equipment pads / grout	Structural Support [Criteria (a)(2) & (a)(3)]
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Masonry block walls	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Roof framing and decking)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-9 SBO Diesel Generator Enclosure & Fuel Oil Tank Vault

Structural Member	Intended Function(s)
Miscellaneous Steel (Checkered Plates)	Structural Support [Criteria (a)(2) & (a)(3)]
Roofing	Structural Support [Criteria (a)(2) & (a)(3)]
Siding	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Beams, Bracing)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-10 Unit 2 Condensate Polishing Facility and Warehouse No. 5

Structural Member	Intended Function(s)
Masonry block walls	Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Platforms and Grating)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Walls)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Beams, Bracing, Columns and baseplates)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-11 Security Diesel Generator Enclosure

Structural Member	Intended Function(s)
Miscellaneous Steel (Checkered Plates)	Structural Support [Criteria (a)(2) & (a)(3)]
Roofing	Structural Support [Criteria (a)(2) & (a)(3)]
Siding	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Framing	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs)	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Beams, Bracing)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-12 Stack Monitoring Equipment Building

Structural Member	Intended Function(s)
Equipment pads / grout	Structural Support [Criteria (a)(2) & (a)(3)]
Masonry block walls	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Roof slabs, Slabs on grade, Spread footing, Walls)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-13 Millstone Stack

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	Structural Support [Criterion (a)(1)], Missile Barrier
Structural Steel (Beams, Bracing)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-14 Switchyard Control House

Structural Member	Intended Function(s)
Equipment pads / grout	Structural Support [Criteria (a)(2) & (a)(3)]
Masonry block walls	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-15 Retaining Wall

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Footing, Walls)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-16 345kV Switchyard

Structural Member	Intended Function(s)
Structural Reinforced Concrete	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-17 Unit 2 Intake Structure

Structural Member	Intended Function(s)
Doors	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)]
Equipment pads / grout	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Hatches	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Missile barriers	Structural Support [Criterion (a)(1)], Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	Structural Support [Criterion (a)(1)], Source of Cooling, Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Beams, Bracing, Roof framing and decking)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Trash racks	Structural Support [Criterion (a)(1)], Source of Cooling

See Table 2.0-1 for definition of intended function.

Table 2.4.2-18 Sea Walls

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Footing, Walls)	Structural Support [Criterion (a)(1)], Flood Barrier

See Table 2.0-1 for definition of intended function.

Table 2.4.2-19 Unit 2 Discharge Tunnel and Discharge Structure

Structural Member	Intended Function(s)
Structural Reinforced Concrete (Floor slabs, Roof slabs, Walls)	Pressure Boundary, Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-20 Unit 2 Bypass Line

Structural Member	Intended Function(s)
Pipe	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-21 Tank Foundations

Structural Member	Intended Function(s)
Unit 2 Condensate Storage Tank Foundation and Missile Barrier	
Miscellaneous Steel (Brackets, Ladders, Platforms and Grating)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs, Walls)	Structural Support [Criterion (a)(1)], Missile Barrier
Fire Water Tanks 1 and 2 Foundations	
Structural Reinforced Concrete (Footing)	Structural Support [Criteria (a)(2) & (a)(3)]
Unit 2 Diesel Fuel Oil Storage Tank Foundation	
Structural Reinforced Concrete	Structural Support [Criteria (a)(2) & (a)(3)]
Unit 2 Refueling Water Storage Tank Foundation	
Structural Reinforced Concrete (Foundation mat slabs)	Structural Support [Criterion (a)(1)]
SBO Diesel Fuel Oil Storage Tank Foundation	
Structural Reinforced Concrete (Foundation mat slabs)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-22 Yard Structures

Structural Member	Intended Function(s)
Unit 2 Transformer Firewalls and Dikes	
Structural Reinforced Concrete (Footing, Walls)	Structural Support [Criteria (a)(2) & (a)(3)]
A700 Switchgear Enclosure Dike	
Doors	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Structural Reinforced Concrete	Structural Support [Criteria (a)(2) & (a)(3)], Flood Barrier
Unit 2 Diesel Fuel Oil Storage Tank Dike	
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Footing)	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Structural Steel (Beams)	Structural Support [Criteria (a)(2) & (a)(3)]
Unit 2 RWST Valve Pit	
Manhole Covers	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	Structural Support [Criterion (a)(1)], Missile Barrier

See Table 2.0-1 for definition of intended function.

Table 2.4.2-22 Yard Structures

Structural Member	Intended Function(s)
Unit 2 Pipe Trenches	
Hatches	Structural Support [Criterion (a)(1)], Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs, Walls)	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]
Unit 2 Manholes	
Manhole Covers	Structural Support [Criterion (a)(1)], Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	Structural Support [Criterion (a)(1)], Missile Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Unit 2 Duct Banks	
Duct banks	Structural Support [Criterion (a)(1)], Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-22 Yard Structures

Structural Member	Intended Function(s)
Unit 2 Security Lighting Supports (including poles)	
Lighting Poles	Structural Support [Criteria (a)(2) & (a)(3)]
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	Structural Support [Criteria (a)(2) & (a)(3)]
Structural Reinforced Concrete (Footing)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-23 NSSS Equipment Supports

Structural Member	Intended Function(s)
Pressurizer Support: Bolting	Structural Support [Criterion (a)(1)]
Reactor Coolant Pump Support: Plate and Structural Shapes	Structural Support [Criterion (a)(1)]
Reactor Coolant Pump Support: Spring Hanger Assemblies	Structural Support [Criterion (a)(1)]
Reactor Vessel Support: Bolting	Structural Support [Criterion (a)(1)]
Reactor Vessel Support: Plate and Structural Shapes	Structural Support [Criterion (a)(1)]
Reactor Vessel Support: Sliding Support Assembly	Structural Support [Criterion (a)(1)]
Steam Generator Support: Sliding Support Assembly	Structural Support [Criterion (a)(1)]
Steam Generator Support: Bolting	Structural Support [Criterion (a)(1)]
Steam Generator Support: Plate and Structural Shapes	Structural Support [Criterion (a)(1)]
Steam Generator Support: Sliding Base	Structural Support [Criterion (a)(1)]
Steam Generator Support: Snubber Attachment Hardware	Structural Support [Criterion (a)(1)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-24 General Structural Supports

Structural Member	Intended Function(s)
Battery Racks	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Electrical Conduit, Cable Trays	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Sliding Support Bearing and Sliding Surfaces	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Structural Support Components (plate, structural shapes, etc.)	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Vendor-supplied Specialty Items (spring hangers, struts, clamps, vibration isolators, etc.)	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-25 Miscellaneous Structural Commodities

Commodity Group	Intended Function(s)
Bus duct enclosures	Enclosure Protection
Cable tray cover and assembly	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Electrical Component Supports within cabinets and panels	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Enclosure	Enclosure Protection, EQ Barrier, Fire Barrier
Expansion joint/Seismic gap material (between adjacent buildings/structures)	Structural Support [Criteria (a)(2) & (a)(3)]
Expansion joint/Seismic gap material (fire-rated walls)	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Fire boots	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Fire doors and/or EQ barrier doors	EQ Barrier, Fire Barrier, Pressure Boundary, Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Fire resistant coating	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Fire stops	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Fire-rated Cable wraps	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Fire/EQ barrier penetration seals (including ceramic damming material)	EQ Barrier, Fire Barrier, Flood Barrier, Pressure Boundary, Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-25 Miscellaneous Structural Commodities

Commodity Group	Intended Function(s)
Flood door/gate gasket	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Flood doors/gates	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Flood prevention plugs	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Gaskets in Junction, terminal, and pull boxes	Enclosure Protection
Gypsum boards	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Junction, terminal, and pull boxes	Enclosure Protection
Panels and Cabinets	Enclosure Protection, Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Radiant energy shields	Fire Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Stop Log	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Stop Log brackets	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Stop Log gasket	Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]
Switchgear enclosures	Enclosure Protection
Watertight door gasket	Enclosure Protection, Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-25 Miscellaneous Structural Commodities

Commodity Group	Intended Function(s)
Watertight doors	Enclosure Protection, Fire Barrier, Flood Barrier, Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

Table 2.4.2-26 Load Handling Cranes and Devices

Structural Member	Intended Function(s)
Cranes and monorails including bridge & trolley support members (girders, beams, angles, frames, plates, rails & anchorage)	Structural Support [Criteria (a)(2) & (a)(3)], Structural Support [Criterion (a)(1)]
Fuel elevator support members (structural plates, tracks & anchorage)	Structural Support [Criteria (a)(2) & (a)(3)]
Fuel transfer machine and tilting mechanism support members (structural frame, tracks,& anchorage)	Structural Support [Criteria (a)(2) & (a)(3)]

See Table 2.0-1 for definition of intended function.

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL AND INSTRUMENTATION AND CONTROLS SYSTEMS

A listing of the abbreviations used in this section is provided in Section 1.4.

As stated in Section 2.1.5.4, Electrical/I&C Screening, the electrical and I&C components have been screened and evaluated on a plant-wide basis as commodities rather than on a system basis. Section 2.1.5.4 identifies the following electrical/I&C component groups as performing an electrical passive function in support of system intended functions:

- Cables and connectors
- Electrical penetrations
- Bus duct

Cables and connectors within the scope of the Environmental Qualification Program are the subject of time-limited aging analyses as described in Section 4.4, Environmental Qualification of Electric Equipment. The screening results for non-EQ cables and connectors are provided in Section 2.5.1, Cables and Connectors.

The electrical penetration assemblies within the scope of the EQ Program are the subject of a TLAA as described in Section 4.4, Environmental Qualification of Electric Equipment. The screening results for the non-EQ electrical penetration assemblies are provided in Section 2.5.2, Electrical Penetrations.

The screening results for bus ducts are presented in Section 2.5.3, Bus Duct.

2.5.1 CABLES AND CONNECTORS

Description

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.

A cable consists of single or multiple metallic conductors and insulation for each conductor. The cable may also include a metallic shield that provides electromagnetic isolation of the cable from its surroundings.

Cables and connectors are an integral part of plant systems. Many of these cables are not uniquely identified for each system, but are evaluated as commodities across system boundaries based on similar characteristics such as design, materials of construction, environments, and anticipated stressors. Non-EQ cables types included within the commodity evaluation are high-voltage power (above 15kV), medium-voltage power (2.0 kV to 15 kV), low-voltage power (below 2.0 kV), control, instrumentation, and communication cable.

The cables and connectors within the scope of license renewal meet 10 CFR 54.5(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 of a safety-related component, or (iii) relied upon for fire protection, station blackout, pressurized thermal shock, or ATWS. Cables and connectors within the scope of the Environmental Qualification Program are the subject of time-limited aging analyses as described in Section 4.4, Environmental Qualification of Electric Equipment.

The evaluation boundary for the non-EQ cables and connectors includes cables, connectors, terminations, and cables maintained in storage and held in reserve to specifically support a fire protection event.

FSAR Reference

None

Components Subject to AMR

The commodity groups that require aging management review are indicated in Table 2.5.1-1, Cables and Connectors.

The aging management review results for these commodity groups are provided in Table 3.6.2-1: Electrical Components - Cables and Connectors - Aging Management Evaluation.

2.5.2 ELECTRICAL PENETRATIONS

Description

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.

The electrical penetrations are within the scope of license renewal because they meet 10 CFR 54.4(a)(1) by providing 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 Section 4.4, Environmental Qualification of Electric Equipment.

The evaluation boundary of the non-EQ electrical penetrations includes the sealed conductor feed-through module welded to the Containment liner and the conductor extensions of both ends.

FSAR Reference

Additional details of electrical penetrations can be found in the FSAR, Sections 5.2.7.1.1 and 8.7.2.2.

Components Subject to AMR

The component types that require aging management review are indicated in Table 2.5.2-1, Electrical Penetrations.

The results of the aging management review of these components are provided in Table 3.6.2-2: Electrical Components - Electrical Penetrations - Aging Management Evaluation.

2.5.3 BUS DUCT

Description

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.

The four incoming power line sources to the CL&P 345kV switchyard are available to supply power to either the North or South Bus structures. The North Bus supplies power to the Reserve Station Service Transformer through an overhead line. The three-, four-, and five-inch switchyard type tubular bus ducts located in the CL&P switchyard are used for the “A” (North) bus, the “A” bus connections to the various incoming power sources, and the connection to the overhead line providing power to the Reserve Station Service Transformer. The primary side of the transformer is connected to this line using a tubular bus duct. The secondary side of the transformer has two windings of 6.9kV and 4.16kV. The 6.9kV winding supplies the two normal buses. Failure of these circuits would cause a trip of the switchyard breaker that is in service supplying power for the restoration of off-site power during an SBO event.

These switchyard type tubular bus ducts are within the scope of license renewal for 10CFR 54.4(a)(3) since they are required for the restoration of offsite power during a station blackout event.

The evaluation boundary consists of the bus ducts and support insulators between equipment connections.

The supporting structures for bus ducts are considered General Structural Supports and are evaluated in Section 2.4.4, General Structural Supports.

FSAR Reference

None

Components Subject to AMR

The component types that require aging management review are indicated in Table 2.5.3-1, Bus Duct.

The results of the aging management review of these components are provided in Table 3.6.2-3: Electrical Components - Bus Duct - Aging Management Evaluation.

Screening Results Tables: Electrical and Instrumentation and Controls Systems

See Table 2.0-1 for definition of intended function.

Table 2.5.1-1 Cables and Connectors

Commodity Group	Intended Function(s)
Conductors	Conducts Electricity
Insulation	Insulate

See Table 2.0-1 for definition of intended function.

Table 2.5.2-1 Electrical Penetrations

Component Type	Intended Function(s)
Conductor	Conducts Electricity
Feed-through module, Header plates, Bolting hardware, Compression connectors	Pressure Boundary, Structural Support
Feed-through sealant	Insulate, Pressure Boundary
Insulation	Insulate
Internal conductor support	Structural Support
Penetration seals	Pressure Boundary

See Table 2.0-1 for definition of intended function.

Table 2.5.3-1 Bus Duct

Component Type	Intended Function(s)
Bus Duct	Conducts Electricity
Bus Support Insulator	Insulate, Structural Support

See Table 2.0-1 for definition of intended function.

3.0 AGING MANAGEMENT REVIEW RESULTS

This section provides the results of the aging management review for those structures and components identified in Section 2.0 as being subject to aging management review. The methodology used for performing aging management reviews, including the process for identifying the aging effects requiring management, is explained in Appendix C, Aging Management Review Methodology.

Descriptions of the internal and external service environments which were used in the aging management review to determine aging effects requiring management are included in Table 3.0-1, Internal Service Environments and Table 3.0-2, External Service Environments. The environments used in the aging management reviews are listed in the Environment column.

Aging Management Review (AMR) results information in Section 3 is presented in the following two table types:

Table 3.x.1 - where:

- '**3**' indicates the LRA section number
- '**x**' indicates the subsection number from NUREG 1801, Volume 1, and
- '**1**' indicates that this is the first table type in Section 3.

For example, in the Reactor Coolant System subsection, this is table 3.1.1, in the Engineered Safety Features subsection, this is table 3.2.1, and so on. For ease of discussion, these tables will hereafter be referred to as "Table 1." These tables are derived from the corresponding tables in NUREG-1801, Volume 1; and present summary information from the AMRs.

Table 3.x.2-y - where:

- '**3**' indicates the LRA section number
- '**x**' indicates the subsection number from NUREG 1801, Volume 1, and
- '**2**' indicates that this is the second table type in Section 3; and '**y**' indicates the system table number.

For example, within the Reactor Coolant System subsection, the AMR results for the reactor vessel are presented in table 3.1.2-1, and the results for the Reactor Vessel Internals are presented in table 3.1.2-2. In the Engineered Safety Features subsection, the Containment Spray results are presented in Table 3.2.2-1, and the Safety Injection results are presented in Table 3.2.2-2. For ease of discussion, these tables will hereafter be referred to as "Table 2." These tables present the results of the AMRs.

TABLE DESCRIPTION

NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," contains the staff's generic evaluation of the existing plant programs. It 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 report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components, within the scope of license renewal, without change. The report also contains recommendations on specific areas for which existing programs should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the AMR results and the tables of NUREG-1801 has been made. The results of that comparison are provided in the two tables.

Table 1 (Figure 3.0-1)

The purpose of Table 1 is to provide a summary comparison of how the applicant aligns with the corresponding tables of NUREG-1801, Volume 1. The table is essentially the same as Tables 1 through 6 provided in NUREG-1801, 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 (including a hyperlink to the program in this application)
- The name of a plant specific program being used (including a hyperlink to the program in this application)
- Exceptions to the NUREG-1801 assumptions.
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1, when that may not be intuitively obvious
- A discussion of how the item is different than the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent (e.g., when there is exception taken to an aging management program that is listed in NUREG-1801, Volume 1)

The format of Table 1 provides the reviewer with a means of aligning a specific Table 1 row with the corresponding NUREG-1801, Volume 1 table row, thereby allowing for the ease of checking consistency.

Table 2 (Figure 3.0-2)

Table 2 provides the detailed results of the aging management reviews for those components identified in LRA Section 2 as being subject to aging management review. There will be a Table 2 for each of the subsystems within a "system" grouping. For example, for a PWR, the Engineered Safety Features System Group contains tables specific to Containment Spray, Containment Isolation, Emergency Core Cooling System, etc.

Table 2 consists of the following nine columns:

- Component Type
- Intended Function
- Material
- Environment
- Aging Effect Requiring Management
- Aging Management Programs
- NUREG-1801 Volume 2 Item
- Table 1 Item
- Notes

Component Type

The first column identifies all of the component types from Section 2 of the LRA that are subject to aging management review. They are listed in alphabetical order.

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 is contained within the Intended Functions table of LRA Section 2.

Material

The third column lists the particular materials of construction for the component type.

Environment

The forth 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 provides in the Internal Service Environments and External Service Environments tables of LRA Section 3.

Aging Effect Requiring Management

As part of the aging management review process, the applicant determines any aging effects requiring management for the material and environment combination in order to maintain the intended function of the component type. These aging effects requiring management are listed in column five.

Aging Management Programs

The aging management programs used to manage the aging effects requiring management are listed in column six of Table 2.

NUREG-1801 Vol. 2 Item

Each combination of component type, material, environment, aging effect requiring management, and aging management program that is listed in Table 2, is compared to NUREG-1801, Volume 2 with considerations given to the standard notes, to identify consistencies. When they are identified, they are documented by noting the appropriate NUREG-1801, Volume 2 item number in column seven of Table 2. If there is no corresponding item number in NUREG-1801, Volume 2, this row in column seven is left blank. That way, a reviewer can readily identify where there is correspondence between the plant specific tables and the NUREG-1801, Volume 2 tables.

Table 1 Item

Each combination of component, material, environment, aging effect requiring management, and aging management program that has an identified NUREG-1801 Volume 2 item number must also have a Table 3.x.1 line item reference number. The corresponding line item from Table 1 is listed in column eight of Table 2. If there is no corresponding item in NUREG-1801, Volume 1, this row in column eight is left blank. That way, the information from the two tables can be correlated.

Notes

In order to realize the full benefit of NUREG-1801, each applicant needs to identify how the information in Table 2 aligns with the information in NUREG-1801, Volume 2. This is accomplished through a series of notes. All note references with letters are standard notes that will be the same from application to application. Any notes the plant requires which are in addition to the standard notes will be identified by a number and deemed plant specific.

TABLE USAGE

Table 1

The reviewer evaluates each row in Table 1 by moving from left to right across the table. Since the Component, Aging Effect/Mechanism, Aging Management Programs and Further Evaluation Recommended information is taken directly from NUREG-1801, Volume 1, no further analysis of those columns is required. The information intended to help the reviewer the most in this table is contained within the Discussion column. Here the reviewer will be given information necessary to determine, in summary, how the applicant's evaluations and programs align with NUREG-1801, Volume 1. This may be in the form of descriptive information within the Discussion column or the reviewer may be referred to other locations within the LRA for further information (including hyper links where possible/practical).

Table 2

Table 2 contains all of the Aging Management Review information for the plant, whether or not it aligns with NUREG-1801. For a given row within the table, the reviewer is able to see the intended function, material, environment, aging effect requiring management and aging management program combination for a particular component type within a system. In addition, if there is a correlation between the combination in Table 2 and a combination in NUREG-1801, Volume 2, this will be identified by a referenced item number in column seven, NUREG-1801, Volume 2 Item. The reviewer can refer to the item number in NUREG-1801, Volume 2, if desired, to verify the correlation. If the column is blank, the applicant was unable to locate an appropriately corresponding combination in NUREG-1801, Volume 2. As the reviewer continues across the table from left to right, within a given row, the next column is labeled Table 1 Item. If there is a reference number in this column, the reviewer is able to use that reference number to locate the corresponding row in Table 1 and see how the aging management program for this particular combination aligns with NUREG-1801. There may be a hyper link directly to the corresponding row in Table 1 as well.

Table 2 provides the reviewer with a means to navigate from the components subject to Aging Management Review (AMR) in LRA Section 2 all the way through the evaluation of the programs that will be used to manage the effects of aging of those components.

A listing of the abbreviations used in this section is provided in Section 1.4.

Table 3.0-1 Internal Service Environments

Environment	Description
Air	Dry/filtered compressed air, non-dried compressed air, ambient (conditioned or non-conditioned) room air, or atmospheric air (when internal to components such as ventilation system components, components open to atmosphere, etc.). Moisture-laden air conditions are noted, when applicable.
Gas	Nitrogen, oxygen, hydrogen, carbon dioxide, helium, freon, or Halon gases. Also may include vent gases from process systems.
Oil	Lubricating or fuel oil used for in-scope plant equipment.
Raw Water[1]	From a groundwater or other uncontrolled-quality water source. Raw water is not demineralized or chemically treated to any significant extent. In general, raw water is rough filtered to remove large particles. Other designations of raw water include water that leaks from any system and condensation.
Sea Water[1]	Water from a bay, sound, or ocean source. Sea water is not demineralized or chemically treated to any significant extent. In general, sea water is rough filtered to remove large particles. Biocides may be added to sea water to control micro-organisms or macro-organisms.
Treated water[1] (includes Steam)	Demineralized water or chemically purified water which is the source for water that may require further processing, such as for the primary or secondary coolant system. Treated water can be de-aerated, can include corrosion inhibitors, biocides, or boric acid, or can include a combination of treatments. Steam generated from treated water is included in this environment category.

1. While these are considered internal environments for plant systems, they may also be identified as external environments for certain structural members and system components that are submerged.

Table 3.0-2 External Service Environments

Environment[1]	Description
Air	Indoor air environments as described below: Sheltered Air - The sheltered air environment includes atmospheric air inside covered structures that provide protection from precipitation and wind. This environment is defined by a bulk average air temperature range of 40°F to 130°F and a 60-year maximum design ionizing dose of $1x10^6$ rads. Containment Air - The Containment air environment is defined by a bulk average air temperature range of 105°F to 120°F, except the pressurizer block house which can approach 150°F. Normal operating pressure is between -12 in. w.g. and 1.0 psig. The 60-year maximum design ionizing dose ranges between $6.6x10^5$ rads and $8.7x10^7$ rads. NOTES 1.Certain structures or components may experience environmental conditions that deviate from the stated ranges or maximum values. The actual environmental condition(s) for these structures or components were used in the aging evaluation when the condition could affect the results. 2.Structural members may be associated with mechanical system components that may have the potential for condensation or intermittent wetting. Therefore, structural members have been conservatively assumed to be intermittently wetted in an air environment. 3.Mechanical components are assumed to be in an air environment that is not subject to intermittent wetting. Intermittently wetted conditions are noted, when applicable, such as from condensation.
Atmosphere / Weather	Air environment outside covered structures which includes precipitation and wind. Components and structures in this environment are subject to intermittent wetting. The outdoor air environment also includes exposure to ultraviolet radiation and ozone. This environment is bounded by a bulk average air temperature range of -5.1°F to 91°F and a 60-year maximum design ionizing dose of less than 150 rads.

Table 3.0-2 External Service Environments

Environment[1]	Description
Borated Water Leakage	The borated water leakage environment applies in all plant areas that include components and systems that contain borated water and that could leak on nearby components or structures. This environment is specified in the aging management review results only for materials susceptible to boric acid corrosion (carbon steel, low-alloy steels, and copper alloys).
Soil	The external environment for structures and components buried in the ground. Buried components (pipes and valves) are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The soil is assumed to entrain raw water and buried components are evaluated for the effects of corrosion. Concrete structural members below grade elevation are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The site groundwater is non-aggressive to concrete. Steel piles are driven in undisturbed soil such that the soil environment surrounding the piles is deficient in oxygen at depths of a few feet below grade or below the water table. Therefore, the soil environment is not considered corrosive to steel piles.

1. For certain structural members and system components that are submerged, the applicable environment identified in Table 3.0-1, Internal Service Environments, is specified in the aging management review results.

Figure 3.0-1 **Table 1**

Table 3.x.1 Summary of Aging Management Evaluations in Chapter__ of NUREG-1801 for ____________

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.x.1- 01					
3.x.1- 02					
3.x.1- 03					
3.x.1- 04					
3.x.1- 05					
3.x.1- 06					

Figure 3.0-2 **Table 2**

Table 3.x.2- y Section 3 Title - Plant Specific System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.1, Reactor Coolant System, as being subject to aging management review. The following are addressed in this section and are described in the indicated sections.

- Reactor vessel (Section 2.3.1.1)
- Reactor vessel internals (Section 2.3.1.2)
- Reactor coolant system (Section 2.3.1.3)
- Steam generator (Section 2.3.1.4)

The methodology used for performing aging management reviews including the process for identifying the aging effects requiring management is explained in Appendix C, Aging Management Review Methodology.

Table 3.1.1, Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System, provides the summary of the programs evaluated in NUREG-1801 for the Reactor Vessel, Internals, and Reactor Coolant System component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.1.2 RESULTS

The following tables summarize the results of the aging management review for the Reactor Vessel, Internals, and Reactor Coolant System group.

Table 3.1.2-1, Reactor Vessel - Aging Management Evaluation

Table 3.1.2-2, Reactor Vessel Internals - Aging Management Evaluation

Table 3.1.2-3, Reactor Coolant - Aging Management Evaluation

Table 3.1.2-4, Steam Generator - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above major components and the Reactor Coolant System in the following subsections of Section 3.1.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.1.2.1.1, Reactor Vessel

Section 3.1.2.1.2, Reactor Vessel Internals

Section 3.1.2.1.3, Reactor Coolant System

Section 3.1.2.1.4, Steam Generator

3.1.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.1.2.1.1 Reactor Vessel

Materials

The materials of construction for the reactor vessel subcomponents are:

- Low-alloy Steel
- Nickel-based alloys
- Stainless Steel

Environment

The reactor vessel subcomponents are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the reactor vessel subcomponents, require management:

- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the reactor vessel subcomponents:

- 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

3.1.2.1.2 Reactor Vessel Internals

Materials

The materials of construction for the reactor vessel internals subcomponents are:

- Stainless Steel
- Stainless Steel (CASS)

Environment

The reactor vessel internals subcomponents are exposed to the following environments:

- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the reactor vessel internals subcomponents, require management:

- Change in Dimension
- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the reactor vessel internals subcomponents:

- Chemistry Control for Primary Systems Program
- Inservice Inspection Program: Reactor Vessel Internals

3.1.2.1.3 Reactor Coolant System

Materials

The materials of construction for the Reactor Coolant System components are:

- Carbon Steel
- Copper alloys
- Low-alloy Steel

- Nickel-based alloys
- Stainless Steel
- Stainless Steel (CASS)

Environment

The Reactor Coolant System components are exposed to the following environments:

- Air
- Borated Water Leakage
- Oil
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Reactor Coolant System, require management:

- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Coolant System 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

3.1.2.1.4 Steam Generator

Materials

The materials of construction for the steam generator subcomponents are:

- Carbon Steel

- Low-alloy Steel
- Nickel-based alloys
- Rubber
- Stainless Steel

Environment

The steam generator subcomponents are exposed to the following environments:

- Air
- Borated Water Leakage
- Steam
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the steam generator subcomponents, require management:

- Change of Material Properties
- Cracking
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the steam generator subcomponents:

- 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

3.1.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Reactor Vessel, Internals, and Reactor Coolant System, including the Steam Generator, those programs are addressed in the following sections.

3.1.2.2.1 Cumulative Fatigue Damage (BWR/PWR)

Fatigue 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 Section 4.3, Metal Fatigue.

3.1.2.2.2.1 Loss of Material due to Pitting and Crevice Corrosion (BWR/PWR)

Loss of material in the steam generator shell and transition cone is managed with the Chemistry Control for Secondary Systems Program. Cracking is managed by the Inservice Inspection Program: Systems, Components and Supports.

NUREG-1800 references NRC Information Notice 90-04, *Cracking of the Upper Shell-to-transition Cone Girth Welds In Steam Generators,* and recommends augmented inspection to manage pitting and corrosion. IN 90-04 indicates that pits on the steam generator shell indicates the presence of corrosion fatigue crack initiation sites, not that pitting corrosion resulted in sufficient degradation to cause loss of component function. This incident type involves cases limited to Westinghouse Model 44 and 51 steam generators. There is no subsequent operating experience identifying pitting corrosion of steam generator shells resulting in reportable indications. Millstone steam generators are not Westinghouse Model 44 or Model 51 units.

Based on the aging management review results that management of loss of material with the Chemistry Control for Secondary Systems Program is adequate, and the lack of operating experience to support this issue for other than the Westinghouse model steam generators noted in IN 90-04, no augmented inspections of the steam generator shell are required.

3.1.2.2.2.2 Loss of Material due to Pitting and Crevice Corrosion (BWR/PWR)

Applicable to BWR Only

3.1.2.2.3.1 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement (BWR/PWR)

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 evaluation of this TLAA is addressed separately in Section 4.2, Reactor Vessel Neutron Embrittlement.

3.1.2.2.3.2 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement (BWR/PWR)

Loss of fracture toughness due to neutron irradiation embrittlement is managed with the Reactor Vessel Surveillance aging management program. This AMP includes a discussion of the surveillance capsule withdrawal schedule during the period of extended operation, as required by 10 CFR Part 50, Appendix H.

3.1.2.2.3.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement (BWR/PWR)

Baffle/former bolts are not used in the reactor vessel. Therefore, this item is not applicable.

3.1.2.2.4.1 Crack Initiation and Growth due to Thermal and Mechanical Loading or Stress Corrosion Cracking (BWR/PWR)

Cracking of small bore piping is managed with the Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports.

In lieu of a one-time inspection, the Work Control Process is used to provide confirmation of the effectiveness of the Chemistry Control for Primary 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. The Work Control Process 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.

3.1.2.2.4.2 Crack Initiation and Growth due to Thermal and Mechanical Loading or Stress Corrosion Cracking (BWR/PWR)

Applicable to BWR Only

3.1.2.2.4.3 Crack Initiation and Growth due to Thermal and Mechanical Loading or Stress Corrosion Cracking (BWR/PWR)

Applicable to BWR Only

3.1.2.2.5 Crack Growth due to Cyclic Loading (PWR)

There are no detected underclad cracks identified for the reactor vessel. Therefore, underclad crack growth due to cyclic loading is not a TLAA.

3.1.2.2.6 Changes in Dimension due to Void Swelling (PWR)

Inservice Inspection requirements for reactor vessel internal components are described in the Inservice Inspection Program: Reactor Vessel Internals.

Millstone will continue to implement all relevant ASME Section XI inspection requirements associated with reactor vessel internals. In addition, 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), and stress corrosion cracking (PWSCC and IASCC) and will implement the appropriate recommendations resulting from this guidance.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 13.

3.1.2.2.7.1 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking (PWR)

Pressurizer Spray Head/Nozzle Assembly and Reactor Vessel Bottom Instrumentation Tubes

The pressurizer spray head assembly/nozzle assembly is fabricated from a nickel-based alloy which is subject to cracking due to SCC. Cracking of the pressurizer spray head assembly/nozzle assembly is managed with the Chemistry Control for Primary Systems Program.

There are no bottom head penetrations in the reactor vessel. Therefore, this item is not applicable.

Reactor Vessel Leak-Off Line

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 3/16" holes in the vessel flange. Leakage flow past the inner o-ring is limited in the event of failure since the 3/16" diameter hole in the flange is smaller than the inside diameter of the leak detection line. Additionally, the potential flowrate through the 3/16" diameter hole in the flange is within the normal make-up capability of the Chemical and Volume Control System. The reactor vessel flange seal leakage detection function of these components does not meet the criteria of 10CFR54.4(a) as an intended function. Additionally, the O-ring leak monitoring tubing and valves are not spatially oriented in a fashion that would impact the safety function of any safety-related components.

Based on the above, the leak detection components are not within the scope of license renewal. Therefore, this item is not applicable.

Steam Generator Primary Instrument and Drain Nozzles and Core Support Pads/Guide Lugs

The Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports manages aging effects for the steam generator primary instrument and drain nozzles. For the nickel-based alloy components that are internal to the reactor vessel, the Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Reactor Vessel Internals manage aging effects.

In addition, 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, Table A6.0-1 License Renewal Commitments, Item 14

3.1.2.2.7.2 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking (PWR)

Consistent with NUREG-1801, the Chemistry Control for Primary Systems Program monitors and controls primary water chemistry, in accordance with the guidelines in EPRI TR-105714, to minimize the potential of SCC. Additionally, the Inservice Inspection Program: Systems, Components and Supports manages cracking of CASS components.

3.1.2.2.7.3 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking (PWR)

The Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports manage cracking of pressurizer instrumentation penetrations and heater sheaths and sleeves.

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, Table A6.0-1 License Renewal Commitments, Item 14.

3.1.2.2.8 Crack Initiation and Growth due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking (PWR)

Baffle/former bolts are not used in the reactor vessel internals. Therefore, this item is not applicable.

3.1.2.2.9 Loss of Preload due to Stress Relaxation (PWR)

Baffle/former bolts are not used in the reactor vessel internals. Therefore, this item is not applicable.

3.1.2.2.10 Loss of Section Thickness due to Erosion (PWR)

The Millstone steam generators do not have feedwater impingement plates and associated supports. Therefore, this item is not applicable.

3.1.2.2.11 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 (PWR)

Cracking in the steam generator tube plugs is managed by the Chemistry Control for Primary Systems Program and the Steam Generator Structural Integrity program.

Tube repair sleeves or carbon steel tube support plates are not used in the steam generators.

3.1.2.2.12 Loss of Section Thickness due to Flow-Accelerated Corrosion

The steam generator tube support lattice bars are constructed of stainless steel. Therefore, this item is not applicable.

3.1.2.2.13 Ligament Cracking due to Corrosion (PWR)

Tube support plates are not used in the steam generators. Therefore, this item is not applicable.

3.1.2.2.14 Loss of Material due to Flow-accelerated Corrosion (PWR)

The steam generators are not CE System 80 steam generators. Therefore, this item is not applicable.

3.1.2.3 TIME-LIMITED AGING ANALYSIS

The TLAAs identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Upper Shelf Energy (Section 4.2.2, Upper Shelf Energy)
- Pressurized Thermal Shock (Section 4.2.3, Pressurized Thermal Shock)
- Pressure-Temperature Limits (Section 4.2.4, Pressure-Temperature Limits)
- Code Class Identification (Section 4.3.1, Millstone Unit 2 Class 1 Components)
- Non-Class 1 Components (Section 4.3.2, Non-Class 1 Components)
- Environmentally Assisted Fatigue (Section 4.3.3, Environmentally Assisted Fatigue)
- Reactor Coolant Pump Flywheel (Section 4.7.2, Reactor Coolant Pump Flywheel)
- Reactor Coolant Pump Code Case N-481 (Section 4.7.3, Reactor Coolant Pump Code Case N-481)
- Leak-before break (Section 4.7.4, Leak-Before-Break)

3.1.3 CONCLUSION

The Reactor Vessel, Internals, and Reactor Coolant System components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Reactor Vessel, Internals, and Reactor Coolant System components are identified in the summary tables and Section 3.1.2.1.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the programs provided in Appendix B, the effects of aging associated with the Reactor Vessel, Internals, and Reactor Coolant System components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.1.4 REFERENCES

None

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 01	Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue.
3.1.1- 02	Steam generator shell assembly	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. Loss of material is managed with the Chemistry Control for Secondary Systems Program. This program takes some exceptions to the NUREG-1801 AMP. Further evaluation is documented in Subsection 3.1.2.2.2.1.
3.1.1- 03	BWR Only				
3.1.1- 04	Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E>1 MeV)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	Yes, TLAA	This TLAA is evaluated in Section 4.2, Reactor Vessel Neutron Embrittlement.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 05	Reactor vessel beltline shell and welds	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Yes, plant specific	Consistent with NUREG-1801. Loss of fracture toughness due to neutron irradiation embrittlement is managed with the Reactor Vessel Surveillance aging management program. Further evaluation is documented in Subsection 3.1.2.2.3.2.
3.1.1- 06	Westinghouse and Babcock & Wilcox (B&W) baffle/former bolts	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. Baffle/former bolts are not used in the reactor vessel internals.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 07	Small-bore reactor coolant system and connected systems piping	Crack initiation and growth due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	Yes, parameters monitored / inspected and detection of aging effects are to be further evaluated	Consistent with NUREG-1801. Cracking of small-bore RC piping and fittings is managed with the Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports. These programs take some exceptions to the NUREG-1801 AMPs. Further evaluation is documented in Subsection 3.1.2.2.4.1.
3.1.1- 08	BWR Only				
3.1.1- 09	BWR Only				
3.1.1- 10	Vessel shell	Crack growth due to cyclic loading	TLAA	Yes, TLAA	NUREG-1801 item is not applicable. Underclad crack growth due to cyclic loading was not identified as a TLAA.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 11	Reactor internals	Changes in dimension due to void swelling	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Change in dimensions due to void swelling is managed with the Inservice Inspection Program: Reactor Vessel Internals. Further evaluation is documented in Subsection 3.1.2.2.6.
3.1.1- 12	PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains	Crack initiation and growth due to SCC and/or primary water stress corrosion cracking (PWSCC)	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Cracking is managed with the Chemistry Control for Primary Systems Program, the Inservice Inspection Program: Systems, Components and Supports and the Inservice Inspection Program: Reactor Vessel Internals. Further evaluation is documented in Subsection 3.1.2.2.7.1.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 13	Cast austenitic stainless steel (CASS) reactor coolant system piping	Crack initiation and growth due to SCC	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Crack initiation and growth of CASS RCS piping is managed with the Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports. Further evaluation is documented in Subsection 3.1.2.2.7.2.
3.1.1- 14	Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry	Yes, AMP for PWSCC of Inconel 182 weld is to be evaluated	Consistent with NUREG-1801. Cracking of Ni-based alloy pressurizer components is managed with the Chemistry Control for Primary Systems Program and the Inservice Inspection Program: Systems, Components and Supports. These programs take some exceptions to the NUREG-1801 AMPs. Further evaluation is documented in Subsection 3.1.2.2.7.3.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 15	Westinghouse and B&W baffle former bolts	Crack initiation and growth due to SCC and irradiation-assisted stress corrosion cracking (IASCC)	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. Baffle/former bolts are not used in the reactor vessel internals.
3.1.1- 16	Westinghouse and B&W baffle former bolts	Loss of preload due to stress relaxation	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. Baffle/former bolts are not used in the reactor vessel internals.
3.1.1- 17	Steam generator feedwater impingement plate and support	Loss of section thickness due to erosion	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. The steam generators do not have feedwater impingement plates or supports.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 18	(Alloy 600) Steam generator tubes, repair sleeves, and plugs	Crack initiation and growth due to PWSCC, outside diameter stress corrosion cracking (ODSCC), and/or intergranular attack (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	Yes, effectiveness of a proposed AMP is to be evaluated	Consistent with NUREG-1801. Cracking is managed with the Chemistry Control for Primary Systems Program, which takes some exceptions to the NUREG-1801 AMP, and the Steam Generator Structural Integrity aging management program. Further evaluation is documented in Subsection 3.1.2.2.11.
3.1.1- 19	Tube support lattice bars made of carbon steel	Loss of section thickness due to flow-accelerated corrosion (FAC)	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. The steam generator tube support lattice bars are constructed of stainless steel.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 20	Carbon steel tube support plate	Ligament cracking due to corrosion	Plant specific	Yes, effectiveness of a proposed AMP is to be evaluated	NUREG-1801 item is not applicable. The steam generators do not have carbon steel tube support plates.
3.1.1- 21	Steam generator feedwater inlet ring and supports	Loss of material due to flow accelerated corrosion	Combustion engineering (CE) steam generator feedwater ring inspection	Yes, plant specific	NUREG-1801 item is not applicable. The steam generators are not CE System 80 steam generators.
3.1.1- 22	Reactor vessel closure studs and stud assembly	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	No	Consistent with NUREG-1801. Cracking of the reactor vessel closure head stud assembly is managed with the Inservice Inspection Program: Systems, Components and Supports. This program takes some exceptions to the NUREG-1801 AMP.
3.1.1- 23	CASS pump casing and valve body	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	No	Consistent with NUREG-1801. Loss of fracture toughness for applicable CASS components is managed with the Inservice Inspection Program: Systems, Components and Supports. This program takes some exception to the NUREG-1801 AMP.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 24	CASS piping	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Not consistent with NUREG-1801. Loss of fracture toughness is not an aging effect requiring management for applicable CASS piping and components.
3.1.1- 25	BWR piping and fittings; steam generator components	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Consistent with NUREG-1801. Loss of material is managed with the Flow-Accelerated Corrosion program. This program takes some exceptions to the NUREG-1801 AMP.
3.1.1- 26	Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems	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	No	Not consistent with NUREG-1801. Cracking and loss of preload are managed with the Inservice Inspection Program: Systems, Components and Supports. Loss of material due to wear is not an aging effect requiring management for this bolting.
3.1.1- 27	BWR Only				

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 28	BWR Only				
3.1.1- 29	BWR Only				
3.1.1- 30	BWR Only				
3.1.1- 31	BWR Only				
3.1.1- 32	BWR Only				
3.1.1- 33	BWR Only				
3.1.1- 34	BWR Only				
3.1.1- 35	CRD nozzle	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry	No	Consistent with NUREG-1801. Cracking of nickel-based alloy components is managed with the Inservice Inspection Program: Systems, Components and Supports and the Chemistry Control for Primary Systems Program. These programs take some exceptions to the NUREG-1801 AMPs.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 36	Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting)	Crack initiation and growth due to cyclic loading, and/or SCC, and PWSCC	Inservice inspection; water chemistry	No	Consistent with NUREG-1801. Cracking is managed with the Inservice Inspection Program: Systems, Components and Supports and the Chemistry Control for Primary Systems Program. These programs take some exceptions to the NUREG-1801 AMPs.
3.1.1- 37	Reactor vessel internals CASS components	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement	No	Consistent with NUREG-1801. Loss of fracture toughness is managed with the Inservice Inspection Program: Reactor Vessel Internals. This program takes some exceptions to the NUREG-1801 AMP.
3.1.1- 38	External surfaces of carbon steel components in reactor coolant system pressure boundary	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801. Loss of material due to boric acid corrosion is managed with the Boric Acid Corrosion program.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 39	Steam generator secondary manways and handholds (carbon steel)	Loss of material due to erosion	Inservice inspection	No	NUREG-1801 item is not applicable. The steam generators are recirculating-type steam generators.
3.1.1- 40	Reactor internals, reactor vessel closure studs, and core support pads	Loss of material due to wear	Inservice inspection	No	Consistent with NUREG-1801. Loss of material for reactor vessel internals is managed with the Inservice Inspection Program: Reactor Vessel Internals. This program takes some exceptions to the NUREG-1801 AMP. The RV stud assembly does not experience relative motion other than normal stud tensioning and de-tensioning following refueling activities. Thus, the loss of material due to wear is not considered as age related degradation.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 41	Pressurizer integral support	Crack initiation and growth due to cyclic loading	Inservice inspection	No	Consistent with NUREG-1801. Cracking for pressurizer integral supports is managed with the Inservice Inspection Program: Systems, Components and Supports. This program takes some exceptions to the NUREG-1801 AMP.
3.1.1- 42	Upper and lower internals assembly (Westinghouse)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring	No	NUREG-1801 item is not applicable. The reactor vessel was designed by Combustion Engineering.
3.1.1- 43	Reactor vessel internals in fuel zone region (except Westinghouse and B&W baffle former bolts)	Loss of fracture toughness due to neutron irradiation embrittlement, and void swelling	PWR vessel internals; water chemistry	No	Not consistent with NUREG-1801. Loss of fracture toughness is managed with the Inservice Inspection Program: Reactor Vessel Internals. This program takes some exceptions to the NUREG-1801 AMP. The 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.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 44	Steam generator upper and lower heads, tubesheets, primary nozzles and safe ends	Crack initiation and growth due to SCC, PWSCC. IASCC	Inservice inspection; water chemistry	No	Consistent with NUREG-1801. Cracking is managed with the Inservice Inspection Program: Systems, Components and Supports and the Chemistry Control for Primary Systems Program. These programs take some exceptions to the NUREG-1801 AMPs.
3.1.1- 45	Vessel internals (except Westinghouse and B&W baffle former bolts)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry	No	Consistent with NUREG-1801. Cracking is managed with the Inservice Inspection Program: Reactor Vessel Internals and the Chemistry Control for Primary Systems Program. These programs take some exceptions to the NUREG-1801 AMPs.
3.1.1- 46	Reactor internals (B&W screws and bolts)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	NUREG-1801 item is not applicable. The reactor vessel internals were not designed by B&W.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1- 47	Reactor vessel closure studs and stud assembly	Loss of material due to wear	Reactor head closure studs	No	Not consistent with NUREG-1801. The RV stud assembly does not experience relative motion other than normal stud tensioning and de-tensioning following refueling activities. Thus, the loss of material due to wear is not considered as age related degradation.
3.1.1- 48	Reactor internals (Westinghouse upper and lower internal assemblies; CE bolts and tie rods)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	Not consistent with NUREG-1801. Loss of preload is managed with the Inservice Inspection Program: Reactor Vessel Internals. This program takes some exceptions to the NUREG-1801 AMP. Loose parts monitoring is not credited for managing aging effects for reactor vessel internals.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bottom Head (and cladding)	PB; SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.1-a	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
CEDM Head Penetration Nozzle	PB; SS	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.2-a	3.1.1- 35	B
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.2-a	3.1.1- 35	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEDM Head Penetration Nozzle Flange	PB; SS	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.2-b	3.1.1- 36	D
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.2-b	3.1.1- 36	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
CEDM Pressure Housings	PB; SS	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.2-b	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.2-b	3.1.1- 36	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Head Dome (and cladding)	PB; SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.1-a	3.1.1- 38	A
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H, 7
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Head Flange (and cladding)	PB; SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.1-a	3.1.1- 38	A
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Closure Head Lifting Lugs	SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-v	3.1.1- 41	D
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.1-a	3.1.1- 38	C

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Head Stud Assembly	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.A2.1-c	3.1.1- 22	B
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-p	3.1.1- 26	D
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.1-a	3.1.1- 38	A
Core Stabilizing Lugs and Core Stop Lugs	SS	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.6-a	3.1.1- 12	A
					Inservice Inspection Program: Reactor Vessel Internals	IV.A2.6-a	3.1.1- 12	A
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Skirt, Flow Baffle	FD	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.6-a	3.1.1- 12	C
					Inservice Inspection Program: Reactor Vessel Internals	IV.A2.6-a	3.1.1- 12	C
				Loss of Material	Chemistry Control for Primary Systems Program			H
Head Vent Pipe	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.7-b	3.1.1- 35	B
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.7-b	3.1.1- 35	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Instrument Tube Flange and Studs/Nuts/ Washers	PB; SS	Stainless Steel	(E) Air	Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.A2.2-g	3.1.1- 26	D
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.2-b	3.1.1- 36	D
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.2-b	3.1.1- 36	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
Instrument Tubes	PB; SS	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.7-b	3.1.1- 35	B
					Inservice Inspection Program: Systems, Components and Supports	IV.A2.7-b	3.1.1- 35	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Intermediate and Lower Shell (and cladding)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Fracture Toughness	Reactor Vessel Surveillance	IV.A2.5-c	3.1.1- 05	A
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.5-e	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Nozzle and Safe End (and cladding)	PB; SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.5-e	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Surveillance Capsule Holders	SS	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.A2.6-a	3.1.1- 12	C
					Inservice Inspection Program: Reactor Vessel Internals	IV.A2.6-a	3.1.1- 12	C
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-1: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Shell (and cladding)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.5-e	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Vessel Flange and Core Support Ledge (and cladding)	PB; SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.A2.5-e	3.1.1- 38	A
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEA Shroud Bolts	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.2-b	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-b	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
				Loss of Pre-Load	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-g	3.1.1- 48	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEA Shroud Extension Shaft Guides	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-c	3.1.1- 11	C
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.2-a	3.1.1- 45	D
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-a	3.1.1- 45	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-d	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEA Shrouds - Dual	FD; SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.2-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	D
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEA Shrouds - Single	FD; SS	Stainless Steel (CASS)	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.2-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-e	3.1.1- 37	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.2-e	3.1.1- 37	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Shroud Assembly	FD; SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.4-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Shroud Tie Rods	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.4-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
				Loss of Pre-Load	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-h	3.1.1- 48	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Barrel	FD; SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.3-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-a	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Barrel Alignment Keys	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 11	C
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.3-a	3.1.1- 45	D
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-a	3.1.1- 45	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Barrel Snubber Assemblies	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.5-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-d	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-e	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Barrel Upper Flange	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.3-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-a	3.1.1- 45	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Columns	SS	Stainless Steel (CASS)	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.5-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-f	3.1.1- 37	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-f	3.1.1- 37	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Plate	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.5-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-d	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Compensating Ring	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-b	3.1.1- 11	C
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.3-a	3.1.1- 45	D
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.3-a	3.1.1- 45	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-c	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Alignment Pins	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.5-b	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-b	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-d	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-e	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Alignment Plate	FD; SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.1-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-c	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Alignment Plate Guide Lugs and Guide Lug Inserts	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.1-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.4-c	3.1.1- 43	D
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-c	3.1.1- 40	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
ICI Support Plate and Guide Tubes	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-b	3.1.1- 11	C
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.1-a	3.1.1- 45	D
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-a	3.1.1- 45	D
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Support Structure Beam Assemblies	SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-c	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.5-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-a	3.1.1- 45	B
				Loss of Fracture Toughness	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.5-d	3.1.1- 43	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-2: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Vessel Internals - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Guide Structure Support Plate	FD; SS	Stainless Steel	(E) Treated Water	Change in Dimension	Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-b	3.1.1- 11	A
				Cracking	Chemistry Control for Primary Systems Program	IV.B3.1-a	3.1.1- 45	B
					Inservice Inspection Program: Reactor Vessel Internals	IV.B3.1-a	3.1.1- 45	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	LSI; PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-e	3.1.1- 26	B, 2
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-g	3.1.1- 26	B, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.4-f	3.1.1- 38	A
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	D
Pipe (Connections for CVCS, SI & SDC)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Drains and Instrument Piping and Fittings)	LSI; PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Hot and Cold Leg Piping and Fittings)	PB	Carbon Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	B, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.1-d	3.1.1- 38	A
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	B, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Nozzles for Charging and Safety Injection)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.1-d	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Nozzles for Letdown and Shutdown Cooling)	PB	Carbon Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.1-d	3.1.1- 38	C
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	D
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Nozzles for Press, Temp, and Sampling)	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-k	3.1.1- 14	D
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-k	3.1.1- 14	D
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-k	3.1.1- 14	D, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (RBCCW to RCP)	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 1
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.2-d	3.1.1- 38	A
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Safe End: Charging, Letdown, PZR Sample)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Safe Ends for SI and SDC)	PB	Stainless Steel (CASS)	(E) Air	None	None			H, 6
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-g	3.1.1- 13	B, 6
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-g	3.1.1- 13	B, 6
				Loss of Material	Chemistry Control for Primary Systems Program			H, 6

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Sampling Piping and Fittings)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Small-Bore RC Piping and Fittings)	LSI; PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-g	3.1.1- 07	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-g	3.1.1- 07	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Spray Line Piping and Fittings)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-c	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-c	3.1.1- 36	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Surge Line Piping and Fittings)	PB	Stainless Steel (CASS)	(E) Air	None	None			H, 6
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-e	3.1.1- 13	B, 6
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.1-e	3.1.1- 13	B, 6
				Loss of Material	Chemistry Control for Primary Systems Program			H, 6

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Lower Head)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-c	3.1.1- 36	B, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-b	3.1.1- 38	A
		Nickel-based alloys	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-c	3.1.1- 36	B, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pressurizer (Manway Closure Bolting)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-n	3.1.1- 26	B, 2
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-p	3.1.1- 26	B, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-o	3.1.1- 38	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Manway Cover and Insert)	PB	Carbon Steel	(E) Air	None	None			H, 8
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-o	3.1.1- 38	A, 8
		Stainless Steel	(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-m	3.1.1- 36	B, 5, 8
				Loss of Material	Chemistry Control for Primary Systems Program			H, 8
Pressurizer (Nozzle for Surge Line & Spray Line)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-g	3.1.1- 36	B, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-b	3.1.1- 38	A
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-g	3.1.1- 36	B, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Safe End for PZR Surge Nozzle)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-h	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-h	3.1.1- 36	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pressurizer (Safe Ends for Spray, Relief & Instrument)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-h	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-h	3.1.1- 36	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Seismic Lugs)	SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-v	3.1.1- 41	B
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-u	3.1.1- 38	A
Pressurizer (Shell and Upper Head)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-c	3.1.1- 36	B, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-b	3.1.1- 38	A
		Stainless Steel	(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-c	3.1.1- 36	B, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Spray Head Assembly / Nozzle Assembly)	SP	Nickel-based alloys	(E) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-j	3.1.1- 12	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-j	3.1.1- 12	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pressurizer (Support Skirt and Flange)	SS	Carbon Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-v	3.1.1- 41	B
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.5-u	3.1.1- 38	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer (Temperature, Pressure and Level Nozzles)	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-k	3.1.1- 14	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-k	3.1.1- 14	B
				Loss of Material	Chemistry Control for Primary Systems Program			H
Pressurizer Heaters (Sheathes and Sleeves)	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.5-s	3.1.1- 14	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.5-s	3.1.1- 14	B
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Quench Tank	LSI; PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
RCP Motor Lower Lube Oil Coolers	PB	Copper alloys	(E) Oil	Loss of Material	Work Control Process			F
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System			F
RCP Motor Upper Lube Oil Coolers (Channel Head)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 1
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.5-b	3.2.1- 17	A
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
RCP Motor Upper Lube Oil Coolers (Tube Sheet)	PB	Carbon Steel	(E) Oil	Loss of Material	Work Control Process			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
RCP Motor Upper Lube Oil Coolers (Tubes)	PB	Copper alloys	(E) Oil	Loss of Material	Work Control Process			F
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Seal Coolers (Inner Tube)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System			H
					Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
					Work Control Process			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.1-g	3.1.1- 07	E
				Loss of Material	Chemistry Control for Primary Systems Program			H
RCP Seal Coolers (Outer Tube)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
					Work Control Process			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Thermal Barriers	PB	Stainless Steel (CASS)	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.3-b	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-b	3.1.1- 36	B
				Loss of Fracture Toughness	Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-c	3.1.1- 23	A, 4
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	B
					Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pumps (Casing)	PB	Stainless Steel (CASS)	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.3-b	3.1.1- 36	B
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-b	3.1.1- 36	B
				Loss of Fracture Toughness	Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-c	3.1.1- 23	A, 4
				Loss of Material	Chemistry Control for Primary Systems Program			H
Reactor Coolant Pumps (Closure Bolting)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-e	3.1.1- 26	B
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.C2.3-g	3.1.1- 26	B
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.C2.3-f	3.1.1- 38	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pumps (Driver Mount Assembly)	PB	Stainless Steel	(E) Air	None	None			H
			(I) Air	None	None			H
Rupture Disks	LSI; PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Thermal Sleeves	LTC	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program			H
				Loss of Material	Chemistry Control for Primary Systems Program			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program			H
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 2
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-3: Reactor Vessel, Internals, and Reactor Coolant System - Reactor Coolant - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves (Body)	LSI; PB	Stainless Steel (CASS)	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Chemistry Control for Primary Systems Program	IV.C2.4-b	3.1.1- 36	B, 3
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-b	3.1.1- 36	B, 2
				Loss of Fracture Toughness	Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-c	3.1.1- 23	A, 4
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Base Support and Flange; Support Brackets and Lugs	SS	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-g	3.1.1- 38	C, 10
Divider Plate	FD	Stainless Steel	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program			H
				Loss of Material	Chemistry Control for Primary Systems Program			H
Feedwater Inlet Ring and Support	SS	Carbon Steel	(E) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Nozzle and Safe End	PB	Carbon Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H
Feedwater Nozzle Thermal Sleeve	LTC	Carbon Steel	(E) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H
					Flow-Accelerated Corrosion	IV.D1.1-d	3.1.1- 25	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Head (includes Stay Cylinder and cladding)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.D1.1-i	3.1.1- 44	D, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-g	3.1.1- 38	A, 10
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.D1.1-i	3.1.1- 44	D, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H
Nozzle Dams and Holddown Rings	PB	Nickel-based alloys	(E) Treated Water	Cracking	Work Control Process			H
				Loss of Material	Work Control Process			H
		Rubber	(E) Air	Change of Material Properties	Work Control Process			F
				Cracking	Work Control Process			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Instrument Nozzles	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.D1.1-j	3.1.1- 12	A
					Inservice Inspection Program: Systems, Components and Supports	IV.D1.1-j	3.1.1- 12	A
				Loss of Material	Chemistry Control for Primary Systems Program			H
Primary Manway Bolting	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.D1.1-l	3.1.1- 26	E
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.D1.1-f	3.1.1- 26	E
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-k	3.1.1- 38	A, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Manway Cover and Diaphragm	PB	Low-alloy Steel	(E) Air	None	None			H
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-k	3.1.1- 38	A, 10
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program			H
				Loss of Material	Chemistry Control for Primary Systems Program			H
Primary Nozzle and Safe End (and cladding)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.D1.1-i	3.1.1- 44	B, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-g	3.1.1- 38	C, 10
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.D1.1-i	3.1.1- 44	B, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Secondary Manway and Handhole Bolting	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
Secondary Manway and Handhole Covers	PB	Low-alloy Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program			H
Secondary Side Nozzles (Except Steam and Feedwater)	PB	Carbon Steel	(E) Air	None	None			H
			(I) Treated Water	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Secondary Side Nozzles (Except Steam and Feedwater)	PB	Nickel-based alloys	(E) Air	None	None			H
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H
					Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H
Shroud	FD; SS	Low-alloy Steel	(E) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H
Steam Nozzle and Safe End	PB	Carbon Steel	(E) Air	None	None			H
			(I) Steam	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H
					Flow-Accelerated Corrosion	IV.D1.1-d	3.1.1- 25	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Nozzle Flow Restrictor	RF	Carbon Steel	(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program			H
					Flow-Accelerated Corrosion	IV.D1.1-d	3.1.1- 25	D
Top Head	PB	Low-alloy Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H
Transition Cone	PB	Low-alloy Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program	IV.D1.1-c	3.1.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tube Plugs	PB	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.D1.2-j	3.1.1- 18	B
					Steam Generator Structural Integrity	IV.D1.2-j	3.1.1- 18	A
				Loss of Material	Chemistry Control for Primary Systems Program			H
					Chemistry Control for Secondary Systems Program			H
Tube Support Lattice Bars (includes Lattice Bars, Baffles, U-Bend Supports, and Flat Bars)	SS	Stainless Steel	(E) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			H
				Loss of Material	Chemistry Control for Secondary Systems Program			H
Tube Support Lattice Support Rings	SS	Carbon Steel	(E) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program			H
					Steam Generator Structural Integrity			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubes	PB	Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			F, 9
					Steam Generator Structural Integrity			F, 9
				Loss of Material	Chemistry Control for Secondary Systems Program			F, 9
					Steam Generator Structural Integrity			F, 9
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program			F, 9
					Steam Generator Structural Integrity			F, 9
				Loss of Material	Chemistry Control for Primary Systems Program			F, 9
					Steam Generator Structural Integrity			F, 9

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubesheet (and cladding)	PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports			H, 5
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	IV.D1.1-g	3.1.1- 38	C, 10
			(E) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			H
					Steam Generator Structural Integrity			H
		Nickel-based alloys	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program			H, 5
				Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.1.2-4: Reactor Vessel, Internals, and Reactor Coolant System - Steam Generator - Aging Management Evaluation

Subcomponent	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper and Lower Shell	PB	Low-alloy Steel	(E) Air	None	None			H
			(I) Treated Water and Steam	Cracking	Inservice Inspection Program: Systems, Components and Supports			H
				Loss of Material	Chemistry Control for Secondary Systems Program	IV.D1.1-c	3.1.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Notes for Tables 3.1.2-1 through 3.1.2-4

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The subject components are subject to a moisture-laden air and/or intermittently wetted environment.
2. Only applicable to ASME Class 1 components. Refer to Section C3.8, Loss of Pre-load and Section C3.3.9, Flaw Initiation and Growth – Metals, for further information.
3. Cracking due to SCC is only applicable to stainless steel components exposed to temperatures greater than 140°F. Refer to Section C3.3.15, Stress-Corrosion Cracking – Metals, for further information.
4. Only applicable to CASS components that are subject to temperatures in excess of 482°F. Refer to Section C3.10.3, Thermal Embrittlement – Metals for further information.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Plant Specific Notes (cont.)

5. The cracking aging effect resulting from the flaw initiation and growth mechanism has been applied to the base material, and cracking due to SCC has been applied to the cladding material due to exposure to a treated water environment.

6. NUREG-1801 item IV.C2.2-e is not applicable since loss of fracture toughness is not an aging effect requiring management for RCS piping and fittings fabricated from cast austenitic stainless steel based on the results of the time-limited aging analysis in Section 4.7.4, Leak-Before-Break.

7. The Millstone Unit 2 reactor vessel closure head has been modified in order to effect a repair to three CEDM nozzles (housing tubes). The repair resulted in the low-alloy steel closure head dome material being exposed to the treated (borated) water environment at these penetration locations. A detailed corrosion evaluation was performed for the material/environment created by this modification, and concluded that the dominant corrosion mechanism is general corrosion and that the rate of material removal is insignificant and does not affect the pressure boundary function of the reactor vessel closure head.

8. The manway cover is fabricated from carbon steel and the insert is fabricated from stainless steel.

9. The U-tubes are fabricated from Alloy 690. Alloy 690 is a high-chromium nickel-based alloy that is more resistant to stress corrosion cracking than Alloy 600. For this reason, a material match was not made to the NUREG-1801 items that referenced Alloy 600 material.

10. Loss of material due to boric acid corrosion is only applicable to the primary-side subcomponents of the steam generator. The geometry of the steam generator primary head and the physical distance between the primary manways and the upper and lower shells essentially eliminate the potential for the secondary-side subcomponents to be exposed to boric acid.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES SYSTEMS

3.2.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.2, Engineered Safety Features Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section, are described in the indicated sections.

- Containment Spray System (Section 2.3.2.1)
- Safety Injection System (Section 2.3.2.2)
- Refueling Water Storage Tank and Containment Sump System (Section 2.3.2.3)
- Shutdown Cooling System (Section 2.3.2.4)
- Spent Fuel Pool Cooling System (Section 2.3.2.5)

Table 3.2.1, Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features, provides the summary of the programs evaluated in NUREG-1801 for the Engineered Safety Features component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.2.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Engineered Safety Features Systems group.

Table 3.2.2-1, Containment Spray - Aging Management Evaluation

Table 3.2.2-2, Safety Injection - Aging Management Evaluation

Table 3.2.2-3, Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Table 3.2.2-4, Shutdown Cooling - Aging Management Evaluation

Table 3.2.2-5, Spent Fuel Pool Cooling - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections of Section 3.2.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.2.2.1.1, Containment Spray System

Section 3.2.2.1.2, Safety Injection System

Section 3.2.2.1.3, Refueling Water Storage Tank and Containment Sump System

Section 3.2.2.1.4, Shutdown Cooling System

Section 3.2.2.1.5, Spent Fuel Pool Cooling System

3.2.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.2.2.1.1 Containment Spray System

Materials

The materials of construction for the Containment Spray System component types are:

- Cast Iron
- Low-alloy Steel
- Stainless Steel

Environment

The Containment Spray System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Containment Spray System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Spray System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- Closed-Cycle Cooling Water System
- General Condition Monitoring

3.2.2.1.2 Safety Injection System

Materials

The materials of construction for the Safety Injection System component types are:

- Carbon Steel
- Cast Iron
- Low-alloy Steel
- Stainless Steel
- Stainless Steel (CASS)

Environment

The Safety Injection System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Gas
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Safety Injection System, require management:

- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the Safety Injection System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Inservice Inspection Program: Systems, Components and Supports

3.2.2.1.3 Refueling Water Storage Tank and Containment Sump System

Materials

The materials of construction for the Refueling Water Storage Tank and Containment Sump System component types are:

- Carbon Steel
- Low-alloy Steel
- Stainless Steel

Environment

The Refueling Water Storage Tank and Containment Sump System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Refueling Water Storage Tank and Containment Sump System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Refueling Water Storage Tank and Containment Sump System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.2.2.1.4 Shutdown Cooling System

Materials

The materials of construction for the Shutdown Cooling System component types are:

- Carbon Steel

- Low-alloy Steel
- Stainless Steel
- Stainless Steel (CASS)

Environment

The Shutdown Cooling System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Shutdown Cooling System, require management:

- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the Shutdown Cooling System component types:

- 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

3.2.2.1.5 Spent Fuel Pool Cooling System

Materials

The materials of construction for the Spent Fuel Pool Cooling System component types are:

- Carbon Steel

- Low-alloy Steel
- Stainless Steel

Environment

The Spent Fuel Pool Cooling System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Spent Fuel Pool Cooling System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Spent Fuel Pool Cooling System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.2.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Engineered Safety Features Systems, those programs are addressed in the following sections.

3.2.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3, Metal Fatigue.

3.2.2.2.2.1 Loss of Material due to General Corrosion

Applicable to BWR Only

3.2.2.2.2.2 Loss of Material due to General Corrosion

For loss of material from internal surfaces, this 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 are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components in the engineered safety features systems are also 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. The results of these evaluations are presented in other sections of the license renewal application.

For loss of material from external surfaces, this item applies to carbon steel engineered safety features 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 (refer to Appendix C, Section C3.7.15, General Corrosion – Metals). For these components, loss of material from external surfaces is managed by the General Condition Monitoring program.

3.2.2.2.3.1 Local Loss of Material due to Pitting and Crevice Corrosion

Applicable to BWR Only

3.2.2.2.3.2 Local Loss of Material due to Pitting and Crevice Corrosion

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 the Chemistry Control for Primary Systems Program.

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 the Tank Inspection Program.

3.2.2.2.4 Local Loss of Material due to Microbiologically Influenced Corrosion

Containment isolation components are potentially subject to loss of material due to microbiologically influenced corrosion. Loss of material for these components is managed by the Chemistry Control for Primary Systems Program.

3.2.2.2.5 Changes in Properties due to Elastomer Degradation

Applicable to BWR Only

3.2.2.2.6 Local Loss of Material due to Erosion

The normal charging function is accomplished with positive displacement charging pumps. The centrifugal high-pressure safety injection pumps are not used for normal charging. Therefore, this issue is not applicable.

3.2.2.2.7 Buildup of Deposits due to Corrosion

Applicable to BWR Only

3.2.2.3 TIME-LIMITED AGING ANALYSIS

The TLAA identified below are associated with the Engineered Safety Features Systems. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Fatigue (Section 4.3, Metal Fatigue)
- Leak-before break (Section 4.7.3, Leak-Before-Break)

3.2.3 CONCLUSION

The components of Engineered Safety Features Systems that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Engineered Safety Features Systems components are identified in the summary tables and Section 3.2.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs.

A description of these aging management programs is provided in Appendix B, Aging Management program, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the programs provided in Appendix B, the effects of aging associated with the Engineered Safety Features Systems components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.2.4 REFERENCES

None

Results Tables: Engineered Safety Features Systems

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 01	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue.
3.2.1- 02	BWR Only				
3.2.1- 03	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. The containment spray components are constructed of stainless steel and are not subject to loss of material due to general corrosion. Containment isolation components in the Engineered Safety Features systems are also 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.
3.2.1- 04	BWR Only				

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 05	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of material for Containment isolation components is managed by the Chemistry Control for Primary Systems Program. Loss of material for the RWST external bottom surface is managed by the Tank Inspection Program. Further evaluation is documented in Subsection 3.2.2.2.3.2.
3.2.1- 06	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion (MIC)	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of material for Containment isolation components is managed by the Chemistry Control for Primary Systems Program. Further evaluation is documented in Subsection 3.2.2.2.4.
3.2.1- 07	BWR Only				
3.2.1- 08	High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. The high-pressure safety injection pumps are not used for normal charging service.
3.2.1- 09	BWR Only				

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 10	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of material is managed by the General Condition Monitoring program. Further evaluation is documented in Subsection 3.2.2.2.2.2.
3.2.1- 11	Piping and fittings of CASS in emergency core cooling systems	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Consistent with NUREG-1801. Loss of fracture toughness for CASS components is managed by the Inservice Inspection Program: Systems, Components and Supports. Loss of fracture toughness is not applicable for CASS components where the service temperature is below the threshold for thermal aging embrittlement (refer to Appendix C, Section C3.10.3, Thermal Embrittlement – Metals).

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 12	Components serviced by open-cycle cooling system	Local loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	No	NUREG-1801 item is not applicable. There are no Engineered Safety Features components in open-cycle cooling water environments.
3.2.1- 13	Components serviced by closed-cycle cooling system	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	No	Consistent with NUREG-1801. Loss of material for components in a closed-cycle cooling water environment is managed by the Closed-Cycle Cooling Water System AMP. This program takes some exceptions to the NUREG-1801 AMP. For components in a treated water environment other than closed-cycle cooling water, loss of material is managed by the Chemistry Control for Primary Systems Program.
3.2.1- 14	BWR Only				

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 15	Pumps, valves, piping, and fittings, and tanks in containment spray and emergency core cooling systems	Crack initiation and growth due to SCC	Water chemistry	No	Consistent with NUREG-1801. Cracking is managed by the Chemistry Control for Primary Systems Program and the Chemistry Control for Secondary Systems Program. These programs take some exceptions to the NUREG-1801 AMP. Cracking is not applicable for components where the service temperature is below the threshold for stress corrosion cracking (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).
3.2.1- 16	BWR Only				
3.2.1- 17	Carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Not consistent with NUREG-1801. Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion and General Condition Monitoring programs.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 18	Closure bolting in high pressure or high temperature systems	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	No	Not consistent with NUREG-1801. Bolting in the Engineered Safety Features systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected (refer to Appendix C, Section C3.7.15, General Corrosion – Metals). Additionally, cracking for bolting in Engineered Safety Features systems is not identified as an aging effect requiring management (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-1: Engineered Safety Features - Containment Spray - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.A.1-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.A.1-b	3.2.1- 17	A, 1
CS Pump Seal Coolers (Shell)	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.A.6-d	3.2.1- 17	A, 1
					General Condition Monitoring	V.A.6-d	3.2.1- 17	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.A.6-c	3.2.1- 13	B
CS Pump Seal Coolers (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.A.6-c	3.2.1- 13	B
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.A.6-c	3.2.1- 13	E
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-1: Engineered Safety Features - Containment Spray - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Spray Nozzles	SP	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-1: Engineered Safety Features - Containment Spray - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Valves (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Low-alloy Steel	(E) Air	Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports			H, 3
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.1-d	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.1-d	3.2.1- 17	A, 1
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
HPSI Pump Seal Coolers (Shell)	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.2-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.2-b	3.2.1- 17	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
HPSI Pump Seal Coolers (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
LPSI Pump Seal Coolers (Shell)	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.2-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.2-b	3.2.1- 17	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
LPSI Pump Seal Coolers (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 4
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 3
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Pipe (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Safety Injection Tanks (Carbon Steel with Stainless Steel Clad)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.7-a	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.7-a	3.2.1- 17	A, 1
		Stainless Steel	(I) Gas	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-2: Engineered Safety Features - Safety Injection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel (CASS)	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	D, 4
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	D, 3
				Loss of Fracture Toughness	Inservice Inspection Program: Systems, Components and Supports	V.D1.1-b	3.2.1- 11	A, 5
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Valves (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.8-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.8-b	3.2.1- 17	A, 1
Bolting	PB	Low-alloy Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.8-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.8-b	3.2.1- 17	A, 1
Encapsulation Piping	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.E.1-a	3.2.1- 17	A, 1
					General Condition Monitoring	V.E.1-a	3.2.1- 17	A, 1
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Borated Water Leakage	Loss of Material	Work Control Process	V.E.1-a	3.2.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Encapsulation Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.E.1-a	3.2.1- 17	A, 1
					General Condition Monitoring	V.E.1-a	3.2.1- 17	A, 1
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Borated Water Leakage	Loss of Material	Work Control Process	V.E.1-a	3.2.1- 17	E
Expansion Joints (Encapsulation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A
Refueling Water Storage Tank	PB	Stainless Steel	(E) Atmosphere/ Weather	Loss of Material	Tank Inspection Program	V.D1.8-c	3.2.1- 05	A, 7
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Rupture Disks	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
TSP Baskets	SS	Stainless Steel	(E) Air	None	None			H
			(I) Air	None	None			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Valves (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-3: Engineered Safety Features - Refueling Water Storage Tank and Containment Sump - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Vortex Breakers (Containment Sump)	VS	Stainless Steel	(E) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Vortex Breakers (RWST)	VS	Stainless Steel	(E) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Low-alloy Steel	(E) Air	Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports			H, 3
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.1-d	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.1-d	3.2.1- 17	A, 1
Carry-Over Tank	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Filter/strainers	FLT; PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Flexible Hoses	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B, 4
					Inservice Inspection Program: Systems, Components and Supports			H, 3
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Pipe (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B
				Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Shutdown Cooling Heat Exchangers (Channel Head with SS Cladding)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.5-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.5-b	3.2.1- 17	A, 1
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	D, 4
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Shutdown Cooling Heat Exchangers (Shell)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	V.E.1-b	3.2.1- 10	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	V.D1.5-b	3.2.1- 17	A, 1
					General Condition Monitoring	V.D1.5-b	3.2.1- 17	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
Shutdown Cooling Heat Exchangers (Tube Sheet with SS Cladding)	PB	Carbon Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
		Stainless Steel	(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Shutdown Cooling Heat Exchangers (Tubing)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	V.D1.5-a	3.2.1- 13	B
					Work Control Process			H
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Vacuum Flask	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Vacuum Pump	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-4: Engineered Safety Features - Shutdown Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel (CASS)	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.4-b	3.2.1- 15	B, 4
					Inservice Inspection Program: Systems, Components and Supports			H, 3
				Loss of Fracture Toughness	Inservice Inspection Program: Systems, Components and Supports	V.D1.1-b	3.2.1- 11	A, 5
				Loss of Material	Chemistry Control for Primary Systems Program	V.D1.5-a	3.2.1- 13	E
Valves (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.D1.1-a	3.2.1- 15	B
				Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-5: Engineered Safety Features - Spent Fuel Pool Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.A3.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.A3.1-a	3.3.1- 14	A, 1
Expansion Joints	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-5: Engineered Safety Features - Spent Fuel Pool Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Spent Fuel Pool Heat Exchangers (Channel Head)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H
Spent Fuel Pool Heat Exchangers (Shell)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.A3.4-b	3.3.1- 14	A, 1
					General Condition Monitoring	VII.A3.4-b	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.A3.4-a	3.3.1- 15	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-5: Engineered Safety Features - Spent Fuel Pool Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spent Fuel Pool Heat Exchangers (Tube Sheet)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Spent Fuel Pool Heat Exchangers (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
					Work Control Process	VII.C2.2-a	3.3.1- 15	E
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.2.2-5: Engineered Safety Features - Spent Fuel Pool Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves (Containment Isolation)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Notes for Tables 3.2.2-1 through 3.2.2-5:

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The Boric Acid Corrosion AMP includes specific inspections of reactor coolant pressure boundary and supporting systems components. The General Condition Monitoring AMP provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the Boric Acid Corrosion AMP.

2. The subject components are subject to a moisture-laden air and/or intermittently wetted environment.

3. Only applicable to ASME Class 1 components. Refer to Appendix C, Section C3.3.9, Flaw Initiation and Growth – Metals and Section C3.8, Loss of Pre-load for further information.

4. Cracking due to SCC is only applicable to stainless steel components exposed to temperatures greater than 140°F. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for further information.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

<u>Plant Specific Notes</u> (cont.)

5. Only applicable to CASS components that are subject to temperatures in excess of 482°F. Refer to Appendix C, Section C3.10.3, Thermal Embrittlement – Metals for further information.

6. General corrosion is applicable to carbon and low-alloy steel components in an air environment only when exposed to intermittent wetting. These components are not intermittently wetted, therefore NUREG-1801 Item VII.I.2-a does not apply.

7. The RWST is a stainless steel tank installed on a concrete pad. The loss of material aging effect is also applicable to the tank bottom due to the potentially adverse external environment. The Tank Inspection Program manages aging of the inaccessible portions of the tank bottom due to externally initiated loss of material.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.3, Auxiliary Systems. The systems, or portions of systems, which are addressed in this section, are described in the indicated sections.

- Circulating Water System (Section 2.3.3.1)
- Screen Wash System (Section 2.3.3.2)
- Service Water System (Section 2.3.3.3)
- Sodium Hypochlorite System (Section 2.3.3.4)
- Reactor Building Closed Cooling Water System (Section 2.3.3.5)
- Chilled Water System (Section 2.3.3.6)
- Instrument Air System (Section 2.3.3.7)
- Nitrogen System (Section 2.3.3.8)
- Station Air System (Section 2.3.3.9)
- Hydrogen System (Section 2.3.3.10)
- Chemical and Volume Control System (Section 2.3.3.11)
- Sampling System (Section 2.3.3.12)
- Primary Makeup Water System (Section 2.3.3.13)
- Access Control Area Air Conditioning System (Section 2.3.3.14)
- Main Condensers Evacuation System (Section 2.3.3.15)
- Containment Air Recirculation and Cooling System (Section 2.3.3.16)
- Containment and Enclosure Building Purge System (Section 2.3.3.17)
- Containment Penetration Cooling System (Section 2.3.3.18)
- Containment Post-Accident Hydrogen Control System (Section 2.3.3.19)
- Control Room Air Conditioning System (Section 2.3.3.20)
- Control Element Drive Mechanism Cooling System (Section 2.3.3.21)
- Diesel Generator Ventilation System (Section 2.3.3.22)
- ESF Room Air Recirculation System (Section 2.3.3.23)
- Enclosure Building Filtration System (Section 2.3.3.24)
- Fuel Handling Area Ventilation System (Section 2.3.3.25)
- Main Exhaust Ventilation System (Section 2.3.3.26)

- Non-Radioactive Area Ventilation System (Section 2.3.3.27)
- Process and Area Radiation Monitoring System (Section 2.3.3.28)
- Radwaste Area Ventilation System (Section 2.3.3.29)
- Turbine Building Ventilation System (Section 2.3.3.30)
- Vital Switchgear Ventilation System (Section 2.3.3.31)
- Unit 2 Fire Protection System (Section 2.3.3.32)
- Unit 3 Fire Protection System (Section 2.3.3.33)
- Domestic Water System (Section 2.3.3.34)
- Diesel Generator System (Section 2.3.3.35)
- Diesel Generator Fuel Oil System (Section 2.3.3.36)
- Station Blackout Diesel Generator System (Section 2.3.3.37)
- Security System (Section 2.3.3.38)
- Clean Liquid Waste Processing System (Section 2.3.3.39)
- Gaseous Waste Processing System (Section 2.3.3.40)
- Post Accident Sampling System (Section 2.3.3.41)
- Station Sumps and Drains System (Section 2.3.3.42)

Table 3.3.1, Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems, provides the summary of the programs evaluated in NUREG-1801 for the Auxiliary Systems component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.3.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Auxiliary System group:

Table 3.3.2-1, Circulating Water - Aging Management Evaluation

Table 3.3.2-2, Screen Wash - Aging Management Evaluation

Table 3.3.2-3, Service Water - Aging Management Evaluation

Table 3.3.2-4, Sodium Hypochlorite - Aging Management Evaluation

Table 3.3.2-5, Reactor Building Closed Cooling Water - Aging Management Evaluation

Table 3.3.2-6, Chilled Water - Aging Management Evaluation

Table 3.3.2-7, Instrument Air - Aging Management Evaluation

Table 3.3.2-35, Diesel Generator Fuel Oil - Aging Management Evaluation

Table 3.3.2-36, Station Blackout Diesel Generator - Aging Management Evaluation

Table 3.3.2-37, Security - Aging Management Evaluation

Table 3.3.2-38, Clean Liquid Waste Processing - Aging Management Evaluation

Table 3.3.2-39, Gaseous Waste Processing - Aging Management Evaluation

Table 3.3.2-40, Post Accident Sampling - Aging Management Evaluation

Table 3.3.2-41, Station Sumps and Drains - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections of Section 3.3.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.3.2.1.1, Circulating Water System

Section 3.3.2.1.2, Screen Wash System

Section 3.3.2.1.3, Service Water System

Section 3.3.2.1.4, Sodium Hypochlorite System

Section 3.3.2.1.5, Reactor Building Closed Cooling Water System

Section 3.3.2.1.6, Chilled Water System

Section 3.3.2.1.7, Instrument Air System

Section 3.3.2.1.8, Nitrogen System

Section 3.3.2.1.9, Station Air System

Section 3.3.2.1.10, Chemical and Volume Control System

Section 3.3.2.1.11, Sampling System

Section 3.3.2.1.12, Primary Makeup Water System

Section 3.3.2.1.13, Access Control Area Air Conditioning System

Section 3.3.2.1.14, Main Condensers Evacuation System

Section 3.3.2.1.15, Containment Air Recirculation and Cooling System

Section 3.3.2.1.16, Containment and Enclosure Building Purge System

Section 3.3.2.1.17, Containment Penetration Cooling System

Section 3.3.2.1.18, Containment Post - Accident Hydrogen Control System

Table 3.3.2.1.19, Control Room Air Conditioning System

Section 3.3.2.1.20, Control Element Drive Mechanism Cooling System

Section 3.3.2.1.21, Diesel Generator Ventilation System

Section 3.3.2.1.22, ESF Room Air Recirculation System

Section 3.3.2.1.23, Enclosure Building Filtration System

Section 3.3.2.1.24, Fuel Handling Area Ventilation System

Section 3.3.2.1.25, Main Exhaust Ventilation System

Section 3.3.2.1.26, Non-Radioactive Area Ventilation System

Section 3.3.2.1.27, Process and Area Radiation Monitoring System

Section 3.3.2.1.28, Radwaste Area Ventilation System

Section 3.3.2.1.29, Turbine Building Ventilation System

Section 3.3.2.1.30, Vital Switchgear Ventilation System

Section 3.3.2.1.31, Unit 2 Fire Protection System

Section 3.3.2.1.32, Unit 3 Fire Protection System

Section 3.3.2.1.33, Domestic Water System

Section 3.3.2.1.34, Diesel Generator System

Section 3.3.2.1.35, Diesel Generator Fuel Oil System

Section 3.3.2.1.36, Station Blackout Diesel Generator System

Section 3.3.2.1.37, Security System

Section 3.3.2.1.38, Clean Liquid Waste Processing System

Section 3.3.2.1.39, Gaseous Waste Processing System

Section 3.3.2.1.40, Post Accident Sampling System

Section 3.3.2.1.41, Station Sumps and Drains System

3.3.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.3.2.1.1 Circulating Water System

Materials

The materials of construction for the Circulating Water System component types are:

- Carbon Steel
- Cast Iron
- Rubber
- Stainless Steel

Environment

The Circulating Water System component types are exposed to the following environments:

- Air
- Sea Water

Aging Effects Requiring Management

The following aging effects, associated with the Circulating Water System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Circulating Water System component types:

- General Condition Monitoring
- Work Control Process

3.3.2.1.2 Screen Wash System

Materials

The materials of construction for the Screen Wash System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Fiberglass
- PVC
- Stainless Steel

Environment

The Screen Wash System component types are exposed to the following environments:

- Air

- Sea Water

Aging Effects Requiring Management

The following aging effects, associated with the Screen Wash System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Screen Wash System component types:

- General Condition Monitoring
- Work Control Process

3.3.2.1.3 Service Water System

Materials

The materials of construction for the Service Water System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Fiberglass
- Nickel-based alloys
- Rubber
- Stainless Steel

Environment

The Service Water System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Damp Soil
- Sea Water

Aging Effects Requiring Management

The following aging effects, associated with the Service Water System, require management:

- Buildup of Deposit
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Service Water System component types:

- Boric Acid Corrosion
- Buried Pipe Inspection Program
- General Condition Monitoring
- Infrequently Accessed Areas Inspection Program
- Service Water System (Open-Cycle Cooling)
- Work Control Process

3.3.2.1.4 Sodium Hypochlorite System

Materials

The materials of construction for the Sodium Hypochlorite System component types are:

- Carbon Steel
- PVC
- Stainless Steel

Environment

The Sodium Hypochlorite System component types are exposed to the following environments:

- Air
- Sea Water

Aging Effects Requiring Management

The following aging effects, associated with the Sodium Hypochlorite System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Sodium Hypochlorite System component types:

- General Condition Monitoring

- Work Control Process

3.3.2.1.5 Reactor Building Closed Cooling Water System

Materials

The materials of construction for the Reactor Building Closed Cooling Water System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Stainless Steel

Environment

The Reactor Building Closed Cooling Water System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Sea Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Reactor Building Closed Cooling Water System, require management:

- Buildup of Deposit
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building Closed Cooling Water System component types:

- Boric Acid Corrosion
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Service Water System (Open-Cycle Cooling)
- Work Control Process

3.3.2.1.6 Chilled Water System

Materials

The materials of construction for the Chilled Water System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Stainless Steel

Environment

The Chilled Water System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Gas
- Sea Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Chilled Water System, require management:

- Buildup of Deposit
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Chilled Water System component types:

- Boric Acid Corrosion
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Service Water System (Open-Cycle Cooling)
- Work Control Process

3.3.2.1.7 Instrument Air System

Materials

The materials of construction for the Instrument Air System component types are:

- Carbon Steel
- Copper alloys
- PVC
- Stainless Steel

Environment

The Instrument Air System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Instrument Air System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Instrument Air System component types:

- Boric Acid Corrosion
- General Condition Monitoring

3.3.2.1.8 Nitrogen System

Materials

The materials of construction for the Nitrogen System component types are:

- Stainless Steel

Environment

The Nitrogen System component types are exposed to the following environments:

- Air
- Gas

Aging Effects Requiring Management

The are no aging effects requiring management associated with the Nitrogen System.

Aging Management Programs

The are no aging management programs required for the Nitrogen System.

3.3.2.1.9 Station Air System

Materials

The materials of construction for the Station Air System component types are:

- Carbon Steel
- Copper alloys

Environment

The Station Air System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Station Air System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Station Air System component types:

- Boric Acid Corrosion
- General Condition Monitoring
- Work Control Process

3.3.2.1.10 Chemical and Volume Control System

Materials

The materials of construction for the Chemical and Volume Control System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Low-alloy Steel
- Stainless Steel

Environment

The Chemical and Volume Control System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Gas
- Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Chemical and Volume Control System, require management:

- Cracking
- Loss of Material
- Loss of Pre-Load

Aging Management Programs

The following aging management programs manage the aging effects for the Chemical and Volume Control System component types:

- 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

3.3.2.1.11 Sampling System

Materials

The materials of construction for the Sampling System component types are:

- Carbon Steel
- Low-alloy Steel
- Stainless Steel

Environment

The Sampling System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Sampling System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Sampling System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- Chemistry Control for Secondary Systems Program
- Closed-Cycle Cooling Water System
- General Condition Monitoring

3.3.2.1.12 Primary Makeup Water System

Materials

The materials of construction for the Primary Makeup Water System component types are:

- Low-alloy Steel
- Stainless Steel

Environment

The Primary Makeup Water System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Primary Makeup Water System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Primary Makeup Water System component types:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring

3.3.2.1.13 Access Control Area Air Conditioning System

Materials

The materials of construction for the Access Control Area Air Conditioning System component types are:

- Carbon Steel

Environment

The Access Control Area Air Conditioning System component types are exposed to the following environments:

- Air

Aging Effects Requiring Management

There are no aging effects requiring management associated with the Access Control Area Air Conditioning System.

Aging Management Programs

There are no aging management programs required for the Access Control Area Air Conditioning System.

3.3.2.1.14 Main Condensers Evacuation System

Materials

The materials of construction for the Main Condensers Evacuation System component types are:

- Carbon Steel

Environment

The Main Condensers Evacuation System component types are exposed to the following environments:

- Air

Aging Effects Requiring Management

The following aging effects, associated with the Main Condensers Evacuation System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Main Condensers Evacuation System component types:

- Work Control Process

3.3.2.1.15 Containment Air Recirculation and Cooling System

Materials

The materials of construction for the Containment Air Recirculation and Cooling System component types are:

- Carbon Steel
- Copper alloys
- Stainless Steel

Environment

The Containment Air Recirculation and Cooling System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Containment Air Recirculation and Cooling System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Air Recirculation and Cooling System component types:

- Boric Acid Corrosion
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.3.2.1.16 Containment and Enclosure Building Purge System

Materials

The materials of construction for the Containment and Enclosure Building Purge System component types are:

- Carbon Steel
- Dux Seal
- Neoprene
- Silicone rubber

Environment

The Containment and Enclosure Building Purge System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Containment and Enclosure Building Purge System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment and Enclosure Building Purge System component types:

- Boric Acid Corrosion

- General Condition Monitoring
- Work Control Process

3.3.2.1.17 Containment Penetration Cooling System

Materials

The materials of construction for the Containment Penetration Cooling System component types are:

- Carbon Steel
- Dux Seal
- Neoprene
- Silicone rubber

Environment

The Containment Penetration Cooling System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Containment Penetration Cooling System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Penetration Cooling System component types:

- Boric Acid Corrosion
- General Condition Monitoring
- Work Control Process

3.3.2.1.18 Containment Post - Accident Hydrogen Control System

Materials

The materials of construction for the Containment Post - Accident Hydrogen Control System component types are:

- Carbon Steel
- Stainless Steel

Environment

The Containment Post - Accident Hydrogen Control System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Containment Post - Accident Hydrogen Control System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Post - Accident Hydrogen Control System component types:

- Boric Acid Corrosion
- General Condition Monitoring

3.3.2.1.19 Control Room Air Conditioning System

Materials

The materials of construction for the Control Room Air Conditioning System component types are:

- Carbon Steel
- Copper alloys
- Dux Seal
- Silicone rubber

Environment

The Control Room Air Conditioning System component types are exposed to the following environments:

- Air
- Gas

Aging Effects Requiring Management

The following aging effects, associated with the Control Room Air Conditioning System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Control Room Air Conditioning System component types:

- General Condition Monitoring
- Work Control Process

3.3.2.1.20 Control Element Drive Mechanism Cooling System

Materials

The materials of construction for the Control Element Drive Mechanism Cooling System component types are:

- Stainless Steel

Environment

The Control Element Drive Mechanism Cooling System component types are exposed to the following environments:

- Air
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Control Element Drive Mechanism Cooling System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Control Element Drive Mechanism Cooling System component types:

- Closed-Cycle Cooling Water System
- Work Control Process

3.3.2.1.21 Diesel Generator Ventilation System

Materials

The materials of construction for the Diesel Generator Ventilation System component types are:

- Carbon Steel
- Dux Seal
- Neoprene
- Silicone rubber

Environment

The Diesel Generator Ventilation System component types are exposed to the following environments:

- Air

Aging Effects Requiring Management

The following aging effects, associated with the Diesel Generator Ventilation System, require management:

- Change of Material Properties
- Cracking

Aging Management Programs

The following aging management programs manage the aging effects for the Diesel Generator Ventilation System component types:

- General Condition Monitoring
- Work Control Process

3.3.2.1.22 ESF Room Air Recirculation System

Materials

The materials of construction for the ESF Room Air Recirculation System component types are:

- Carbon Steel
- Copper alloys
- Dux Seal
- Neoprene
- Silicone rubber

Environment

The ESF Room Air Recirculation System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the ESF Room Air Recirculation System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the ESF Room Air Recirculation System component types:

- Boric Acid Corrosion
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.3.2.1.23 Enclosure Building Filtration System

Materials

The materials of construction for the Enclosure Building Filtration System component types are:

- Carbon Steel
- Copper alloys
- Dux Seal
- Neoprene
- Silicone rubber
- Stainless Steel

Environment

The Enclosure Building Filtration System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Damp Soil

Aging Effects Requiring Management

The following aging effects, associated with the Enclosure Building Filtration System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Enclosure Building Filtration System component types:

- Boric Acid Corrosion
- Buried Pipe Inspection Program
- General Condition Monitoring
- Infrequently Accessed Areas Inspection Program
- Work Control Process

3.3.2.1.24 Fuel Handling Area Ventilation System

Materials

The materials of construction for the Fuel Handling Area Ventilation System component types are:

- Carbon Steel
- Dux Seal
- Silicone rubber
- Stainless Steel

Environment

The Fuel Handling Area Ventilation System component types are exposed to the following environments:

- Air

Aging Effects Requiring Management

The following aging effects, associated with the Fuel Handling Area Ventilation System, require management:

- Change of Material Properties
- Cracking

Aging Management Programs

The following aging management programs manage the aging effects for the Fuel Handling Area Ventilation System component types:

- General Condition Monitoring

3.3.2.1.25 Main Exhaust Ventilation System

Materials

The materials of construction for the Main Exhaust Ventilation System component types are:

- Carbon Steel
- Copper alloys
- Stainless Steel

Environment

The Main Exhaust Ventilation System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Main Exhaust Ventilation System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Main Exhaust Ventilation System component types:

- Boric Acid Corrosion
- General Condition Monitoring

3.3.2.1.26 Non-Radioactive Area Ventilation System

Materials

The materials of construction for the Non-Radioactive Area Ventilation System component types are:

- Carbon Steel
- Copper alloys

Environment

The Non-Radioactive Area Ventilation System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Non-Radioactive Area Ventilation System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Non-Radioactive Area Ventilation System component types:

- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.3.2.1.27 Process and Area Radiation Monitoring System

Materials

The materials of construction for the Process and Area Radiation Monitoring System component types are:

- Carbon Steel
- Stainless Steel

Environment

The Process and Area Radiation Monitoring System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Process and Area Radiation Monitoring System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Process and Area Radiation Monitoring System component types:

- Boric Acid Corrosion
- General Condition Monitoring

3.3.2.1.28 Radwaste Area Ventilation System

Materials

The materials of construction for the Radwaste Area Ventilation System component types are:

- Carbon Steel
- Dux Seal
- Silicone rubber

Environment

The Radwaste Area Ventilation System component types are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Radwaste Area Ventilation System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Radwaste Area Ventilation System component types:

- Boric Acid Corrosion
- General Condition Monitoring

3.3.2.1.29 Turbine Building Ventilation System

Materials

The materials of construction for the Turbine Building Ventilation System component types are:

- Carbon Steel

Environment

The Turbine Building Ventilation System component types are exposed to the following environments:

- Air

Aging Effects Requiring Management

There are no aging effects requiring management associated with the Turbine Building Ventilation System.

Aging Management Programs

There are no aging management programs required for the Turbine Building Ventilation System.

3.3.2.1.30 Vital Switchgear Ventilation System

Materials

The materials of construction for the Vital Switchgear Ventilation System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- Dux Seal
- Silicone rubber

Environment

The Vital Switchgear Ventilation System component types are exposed to the following environments:

- Air
- Gas
- Sea Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Vital Switchgear Ventilation System, require management:

- Buildup of Deposit
- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Vital Switchgear Ventilation System component types:

- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Service Water System (Open-Cycle Cooling)
- Work Control Process

3.3.2.1.31 Unit 2 Fire Protection System

The Unit 2 Fire Protection System is a shared system and the aging management review results presented here and in Table 3.3.2-31, Unit 2 Fire Protection - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Fire Protection System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- PVC
- Stainless Steel

Environment

The Fire Protection System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Damp Soil
- Gas
- Oil
- Raw Water

Aging Effects Requiring Management

The following aging effects, associated with the Fire Protection System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Fire Protection System component types:

- Boric Acid Corrosion
- Buried Pipe Inspection Program
- Fire Protection Program
- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.3.2.1.32 Unit 3 Fire Protection System

The Unit 3 Fire Protection System is a shared system and the aging management review results presented here and in Table 3.3.2-32, Unit 3 Fire Protection - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Fire Protection System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- PVC
- Stainless Steel

Environment

The Fire Protection System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage

- Damp Soil
- Gas
- Oil
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Fire Protection System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Fire Protection System component types:

- Boric Acid Corrosion
- Buried Pipe Inspection Program
- Fire Protection Program
- Fuel Oil Chemistry
- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.3.2.1.33 Domestic Water System

Materials

The materials of construction for the Domestic Water System component types are:

- Copper alloys
- PVC
- Stainless Steel

Environment

The Domestic Water System component types are exposed to the following environments:

- Air
- Raw Water

- Sea Water

Aging Effects Requiring Management

The following aging effects, associated with the Domestic Water System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Domestic Water System component types:

- General Condition Monitoring
- Work Control Process

3.3.2.1.34 Diesel Generator System

Materials

The materials of construction for the Diesel Generator System component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper alloys
- Nickel-based alloys
- Stainless Steel

Environment

The Diesel Generator System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Oil
- Sea Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Diesel Generator System, require management:

- Buildup of Deposit
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Diesel Generator System component types:

- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Service Water System (Open-Cycle Cooling)
- Tank Inspection Program
- Work Control Process

3.3.2.1.35 Diesel Generator Fuel Oil System

Materials

The materials of construction for the Diesel Generator Fuel Oil System component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper alloys
- Stainless Steel

Environment

The Diesel Generator Fuel Oil System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Oil

Aging Effects Requiring Management

The following aging effects, associated with the Diesel Generator Fuel Oil System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Diesel Generator Fuel Oil System component types:

- Fuel Oil Chemistry
- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.3.2.1.36 Station Blackout Diesel Generator System

The Station Blackout Diesel Generator System is a shared system and the aging management review results presented here and in Table 3.3.2-36, Station Blackout Diesel Generator - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Station Blackout Diesel Generator System component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper alloys
- Rubber
- Stainless Steel

Environment

The Station Blackout Diesel Generator System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Station Blackout Diesel Generator System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Station Blackout Diesel Generator System component types:

- Fuel Oil Chemistry
- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.3.2.1.37 Security System

The Security System is a shared system and the aging management review results presented here and in Table 3.3.2-37, Security - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Security System component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper alloys

Environment

The Security System component types are exposed to the following environments:

- Air
- Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Security System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Security System component types:

- Fuel Oil Chemistry
- Tank Inspection Program
- Work Control Process

3.3.2.1.38 Clean Liquid Waste Processing System

Materials

The materials of construction for the Clean Liquid Waste Processing System component types are:

- Carbon Steel
- Stainless Steel

Environment

The Clean Liquid Waste Processing System component types are exposed to the following environments:

- Air
- Raw Water
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Clean Liquid Waste Processing System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Clean Liquid Waste Processing System component types:

- Chemistry Control for Secondary Systems Program
- Closed-Cycle Cooling Water System
- Work Control Process

3.3.2.1.39 Gaseous Waste Processing System

Materials

The materials of construction for the Gaseous Waste Processing System component types are:

- Carbon Steel
- Stainless Steel

Environment

The Gaseous Waste Processing System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Gaseous Waste Processing System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Gaseous Waste Processing System component types:

- Boric Acid Corrosion
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.3.2.1.40 Post Accident Sampling System

Materials

The materials of construction for the Post Accident Sampling System component types are:

- Low-alloy Steel
- Stainless Steel

Environment

The Post Accident Sampling System component types are exposed to the following environments:

- Air
- Borated Water Leakage

- Gas
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Post Accident Sampling System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Post Accident Sampling System component types:

- Boric Acid Corrosion
- General Condition Monitoring
- Work Control Process

3.3.2.1.41 Station Sumps and Drains System

Materials

The materials of construction for the Station Sumps and Drains System component types are:

- Carbon Steel
- Cast Iron
- Copper alloys
- PVC
- Stainless Steel

Environment

The Station Sumps and Drains System component types are exposed to the following environments:

- Air
- Raw Water

Aging Effects Requiring Management

The following aging effects, associated with the Station Sumps and Drains System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Station Sumps and Drains System component types:

- Work Control Process

3.3.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Auxiliary Systems, those programs are addressed in the following sections.

3.3.2.2.1.1 Loss of Material due to General, Pitting, and Crevice Corrosion

Per NUREG-1801, 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.

3.3.2.2.1.2 Loss of Material due to Pitting and Crevice Corrosion

Per NUREG-1801, 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.

3.3.2.2.2 Hardening and Cracking or Loss of Strength due to Elastomer Degradation or Loss of Material due to Wear

There are no elastomer-lined components in the Spent Fuel Pool Cooling System. Therefore, this item is not applicable to Spent Fuel Pool Cooling System components.

Elastomers are used in ventilation systems components and are evaluated for cracking and change of material properties due to thermal and radiation exposure. The Work Control Process and the General Condition Monitoring program manage age-related degradation of elastomers used in ventilation systems components.

Loss of material due to wear for elastomers in the ventilation systems is not an applicable aging effect.

3.3.2.2.3 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3, Metal Fatigue.

3.3.2.2.4 Crack Initiation and Growth due to Cracking or Stress Corrosion Cracking

Cracking is not identified as an aging effect requiring management for the Chemical and Volume Control System high-pressure pump casing or the associated closure bolting. 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 (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).

Although there have been industry instances of cracking of carbon steel and low-alloy steel bolting due to SCC, these failures have been attributed to high yield strength materials (>150 ksi), leaking gaskets, and exposure to contaminants such as lubricants containing molybdenum disulfide. Millstone selects proper bolting material in conjunction with the proper selection of lubricants and, through control of bolt torque, has been effective in eliminating SCC of bolting. Industry data and plant-specific operating experience support this conclusion. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for further discussion of the potential for SCC in bolting.

3.3.2.2.5 Loss of Material due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

The Fire Protection Program, Tank Inspection Program, and 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 effectively managed by the General Condition Monitoring program, Fire Protection Program, Structures Monitoring Program, and Tank Inspection Program. The Infrequently Accessed Areas Inspection Program manages this aging effect for components in infrequently accessed areas.

3.3.2.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion

Loss of material is managed for the components associated with the RCP oil collection system by the 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.

3.3.2.2.7 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

The Fuel Oil Chemistry program 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, the Work Control Process is used to provide confirmation of the effectiveness of the Fuel Oil Chemistry 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. The Work Control Process 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 Fuel Oil Chemistry program. Tank inspections performed under the Tank Inspection Program provide additional confirmation that the Fuel Oil Chemistry program is effective for managing aging effects for applicable tanks.

3.3.2.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components

The commitment to quality assurance for non-safety-related SSCs during the period of extended operation is described in Section B1.3, Quality Assurance Program and Administrative Controls.

3.3.2.2.9 Crack Initiation and Growth due to Stress Corrosion Cracking and Cyclic Loading

Cracking due to SCC for the regenerative and letdown heat exchangers is managed by the Chemistry Control for Primary Systems Program. Verification of the effectiveness of the chemistry control program is provided by the Work Control Process. 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 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.

3.3.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion

Boral is not used in the spent fuel pool for neutron absorption. Therefore, this item is not applicable.

3.3.2.2.11 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

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 the Buried Pipe Inspection Program.

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.

There is no buried piping in the diesel fuel oil systems.

3.3.2.3 TIME-LIMITED AGING ANALYSIS

The TLAA identified below are associated with the Auxiliary Systems. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Fatigue (Section 4.3, Metal Fatigue)
- Leak-before break (Section 4.7.3, Leak-Before-Break)

3.3.3 CONCLUSION

The Auxiliary Systems components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Auxiliary System components are identified in the summary tables and Section 3.3.2.1.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the programs provided in Appendix B, the effects of aging associated with the Auxiliary Systems components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.3.4 REFERENCES

None

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 01	Components in spent fuel pool cooling and cleanup	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	NUREG-1801 item is not applicable. This item applies to carbon steel spent fuel pool cooling and cleanup components with elastomer linings. The Spent Fuel Pool Cooling System does not contain carbon steel components with elastomer linings.
3.3.1- 02	Linings in spent fuel pool cooling and cleanup system; seals and collars in ventilation systems	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant specific	Yes, plant specific	Not consistent with NUREG-1801. There are no elastomer-lined components in the Spent Fuel Pool Cooling System. Cracking and change of material properties aging effects for elastomers used in components in the ventilation systems are managed by the Work Control Process and the General Condition Monitoring program. Loss of material due to wear is not an aging effect requiring management for the elastomers in the ventilation systems. Further evaluation is documented in Subsection 3.3.2.2.2.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 03	Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue.
3.3.1- 04	Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR)	Crack initiation and growth due to SCC or cracking	Plant specific	Yes, plant specific	Not consistent with NUREG-1801. Cracking is not identified as an aging effect requiring management for the high pressure pumps in the Chemical and Volume Control System. Further evaluation is documented in Subsection 3.3.2.2.4.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 05	Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of material is managed by the General Condition Monitoring program, the Fire Protection Program, the Work Control Process, the Tank Inspection Program, the Structures Monitoring Program, and the Infrequently Accessed Areas Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.5.
3.3.1- 06	Components in reactor coolant pump oil collect system of fire protection	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	Yes, detection of aging effects is to be further evaluated	Not consistent with NUREG-1801. Loss of material is managed by the Tank Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.6.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 07	Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. Loss of material for components in a fuel oil environment is managed by the Fuel Oil Chemistry program. This program takes some exceptions to the NUREG-1801 AMP. Further evaluation is documented in Subsection 3.3.2.2.7.
3.3.1- 08	BWR Only				
3.3.1- 09	Heat exchangers in chemical and volume control system	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and a plant-specific verification program	Yes, plant specific	Consistent with NUREG-1801. Cracking for these heat exchangers is managed by the Chemistry Control for Primary Systems Program. This program takes some exceptions to the NUREG-1801 AMP. Further evaluation is documented in Subsection 3.3.2.2.9.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 10	Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. Boral is not used in the spent fuel pool for neutron absorption.
3.3.1- 11	New fuel rack assembly	Loss of material due to general, pitting, and crevice corrosion	Structures monitoring	No	Not consistent with NUREG-1801. The aging management review for the new fuel storage racks concluded that there are no aging effects requiring management. See Section 2.4.2.3, Unit 2 Warehouse Building for additional information.
3.3.1- 12	Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring	No	Consistent with NUREG-1801. Age-related degradation of Boraflex is managed by the Boraflex Monitoring program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 13	Spent fuel storage racks and valves in spent fuel pool cooling and cleanup	Crack initiation and growth due to stress corrosion cracking	Water chemistry	No	Not consistent with NUREG-1801. The spent fuel pool water temperature is maintained below the threshold temperature of 140^{o}F for stress corrosion cracking (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).
3.3.1- 14	Closure bolting and external surfaces of carbon steel and low-alloy steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Not consistent with NUREG-1801. Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion and General Condition Monitoring programs.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 15	Components in or serviced by closed-cycle cooling water system	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	No	Consistent with NUREG-1801. Loss of material for components in a closed-cycle cooling water environment are managed by the Closed-Cycle Cooling Water System aging management program. This program takes some exceptions to the NUREG-1801 AMP. For components in or serviced by closed-cycle cooling water that is not in the scope of the Closed-Cycle Cooling Water System AMP, loss of material is managed by the Work Control Process. For components in a treated water environment other than closed-cycle cooling water, loss of material is managed by the Chemistry Control for Primary Systems Program or the Chemistry Control for Secondary Systems Program.
3.3.1- 16	Cranes including bridge and trolleys and rail system in load handling system	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	No	Consistent with NUREG-1801. Loss of material for crane components is managed by the Inspection Activities: Load Handling Cranes and Devices aging management program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 17	Components in or serviced by open-cycle cooling water systems	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	No	Consistent with NUREG-1801. Loss of material for components in an open-cycle cooling water environment are managed by the Service Water System (Open-Cycle Cooling) AMP. This program takes some exceptions to the NUREG-1801 AMP. For components in or serviced by open-cycle cooling water that is not in the scope of the Service Water System (Open-Cycle Cooling) AMP, aging effects are managed by the Work Control Process. For components in treated water, raw water, or sea water environments other than open-cycle cooling water, aging effects are managed by the Closed-Cycle Cooling Water System AMP or the Work Control Process.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 18	Buried piping and fittings	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	Consistent with NUREG-1801. Loss of material is managed by the Buried Pipe Inspection Program. This program takes some exceptions to the NUREG-1801 AMP. Further evaluation is documented in Subsection 3.3.2.2.11.
3.3.1- 19	Components in compressed air system	Loss of material due to general and pitting corrosion	Compressed air monitoring	No	Not consistent with NUREG-1801. Loss of material is managed by the Work Control Process.
3.3.1- 20	Components (doors and barrier penetration seals) and concrete structures in fire protection	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	No	Not consistent with NUREG-1801. Aging effects are managed by the Fire Protection Program, which takes exception to the NUREG-1801 AMP, and the Work Control Process. Loss of material due to wear is not an applicable aging effect for these components.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 21	Components in water-based fire protection	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	No	Not consistent with NUREG-1801. Loss of material is managed by the Fire Protection Program. Components that are not within the scope of the Fire Protection Program are managed for the effects of aging by the Work Control Process and the Tank Inspection Program.
3.3.1- 22	Components in diesel fire system	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	No	Not consistent with NUREG-1801. Loss of material is managed by the Fuel Oil Chemistry program. This program takes some exceptions to the NUREG-1801 AMP.
3.3.1- 23	Tanks in diesel fuel oil system	Loss of material due to general, pitting, and crevice corrosion	Aboveground carbon steel tanks	No	Consistent with NUREG-1801. Loss of material is managed by the Tank Inspection Program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 24	Closure bolting	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	No	Not consistent with NUREG-1801. Bolting in the auxiliary systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected (refer to Appendix C, Section C3.7.15, General Corrosion – Metals). Additionally, cracking for bolting in auxiliary systems is not identified as an aging effect requiring management (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).
3.3.1- 25	BWR Only				
3.3.1- 26	BWR Only				
3.3.1- 27	BWR Only				
3.3.1- 28	BWR Only				

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1- 29	Components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink	Loss of material due to selective leaching	Selective leaching of materials	No	Not consistent with NUREG-1801. Loss of material due to selective leaching is managed by the Work Control Process and the Buried Pipe Inspection Program.
3.3.1- 30	Fire barriers, walls, ceilings, and floors in fire protection	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	No	Not consistent with NUREG-1801. Concrete elements such as walls, ceilings, and floors that perform a fire barrier function are evaluated as a part of the parent structure. Aging effects associated with concrete and reinforcement are managed as described in Section 3.5, Aging Management of Containment, Structures and Component Supports.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-1: Auxiliary Systems - Circulating Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints	PB	Rubber	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Pipe	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
Valves	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-2: Auxiliary Systems - Screen Wash - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Pipe	LSI; PB	Fiberglass	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Pumps (screen wash)	LSI; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.5-a	3.3.1- 17	E
					Work Control Process	VII.C1.5-a	3.3.1- 29	E
Strainers (screen wash pump)	LSI; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.6-a	3.3.1- 17	E
Strainers (traveling water screen)	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Tubing	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-2: Auxiliary Systems - Screen Wash - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
Valves	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
Valves	LSI; PB	PVC	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Valves	LSI; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints (SW pumps and vital switchgear cooling coils)	PB	Rubber	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Expansion Joints (SW to EDGs)	PB	Nickel-based alloys	(E) Air	Loss of Material	General Condition Monitoring			F, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)			F
Filter/strainers	FLT; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.6-a	3.3.1- 17	B
Filter/strainers	FLT; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.6-a	3.3.1- 17	B
Flow Elements	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.4-a	3.3.1- 17	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Indicators	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.4-a	3.3.1- 17	D
Flow Orifices	LSI; PB; RF	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.4-a	3.3.1- 17	B
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
					Infrequently Accessed Areas Inspection Program	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
Pipe	LSI; PB	Cast Iron	(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
					Buried Pipe Inspection Program	VII.C1.1-c	3.3.1- 29	E
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Pipe	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	D
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
					Work Control Process	VII.C1.1-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel	(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
Pipe	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
Pipe	LSI; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
					Infrequently Accessed Areas Inspection Program	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)			H
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	B
					Work Control Process	VII.C1.1-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pumps (service water)	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	D
Restricting Orifices	LSI; PB; RF	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.4-a	3.3.1- 17	B
SW Pump Motor Protective Tank	PB	Fiberglass	(E) Air	None	None			F
			(I) Air	None	None			F
Tubing	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	D
					Work Control Process	VII.C1.1-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.1-a	3.3.1- 17	D
Tubing	LSI; PB	Nickel-based alloys	(E) Air	Loss of Material	General Condition Monitoring			F, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)			F
Valves	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.2-a	3.3.1- 17	B
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.2-a	3.3.1- 17	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-3: Auxiliary Systems - Service Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.2-a	3.3.1- 17	B
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Valves	LSI; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.2-a	3.3.1- 17	B
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-4: Auxiliary Systems - Sodium Hypochlorite - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	PVC	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Valves	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
Valves	LSI; PB	PVC	(E) Air	None	None			F
			(I) Sea Water	None	None			F
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Flow Indicators	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Flow Indicators	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.5-a	3.3.1- 15	D
Flow Orifices	PB; RF	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Switches	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.1-a	3.3.1- 15	B
Pumps	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.3-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RBCCW Heat Exchangers (Channel)	HT; PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
RBCCW Heat Exchangers (Shell)	HT; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.5-a	3.3.1- 15	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RBCCW Heat Exchangers (Tubes)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
					Work Control Process			H
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
RBCCW Heat Exchangers (Tubesheet)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
RBCCW Surge Tank	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Air	Loss of Material	Work Control Process	VII.D.3-a	3.3.1- 19	E, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Support Concrete Cooling Coils	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.5-a	3.3.1- 15	D
Tubing	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Valves	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-5: Auxiliary Systems - Reactor Building Closed Cooling Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-6: Auxiliary Systems - Chilled Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Chilled Water Chillers (Shell)	HT; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Gas	None	None			G
Chilled Water Chillers (Tubes)	HT; PB	Copper alloys	(E) Gas	None	None			G
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Chilled Water Evaporators (Shell)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	D
Chilled Water Evaporators (Tubes)	PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
			(I) Gas	None	None			G
Chilled Water Surge Tank	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-6: Auxiliary Systems - Chilled Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Compressor Casings	PB	Cast Iron	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Gas	None	None			G
Filter/strainers	FLT; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Gas	None	None			G
Flow Elements	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Level Indicators	PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Gas	None	None			G
Moisture Indicators	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-6: Auxiliary Systems - Chilled Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.1-a	3.3.1- 15	B
Pumps	PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Tubing	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-6: Auxiliary Systems - Chilled Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	B
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Gas	None	None			G
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	B
Valves	LSI; PB	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-7: Auxiliary Systems - Instrument Air - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Accumulators (Reserve Air Bottles)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 7
Hoses	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Pipe	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	None	None			G
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 8

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-7: Auxiliary Systems - Instrument Air - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Regulators	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	None	None			G
Regulators	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	None	None			G
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Tubing (Stored Tubing and Fittings)	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G
		PVC	(E) Air	None	None			G
			(I) Air	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-7: Auxiliary Systems - Instrument Air - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 9
Valves	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-8: Auxiliary Systems - Nitrogen - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-9: Auxiliary Systems - Station Air - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.D.1-a	3.3.1- 19	E, 2
Pipe	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	Loss of Material	Work Control Process			G, 2
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.D.2-a	3.3.1- 19	E, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-9: Auxiliary Systems - Station Air - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	Loss of Material	Work Control Process			G, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	LSI; PB	Low-alloy Steel	(E) Air	Cracking	Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-e	3.1.1- 26	B, 3
				Loss of Pre-Load	Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-g	3.1.1- 26	B, 3
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Boric Acid Tanks	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Filter/strainers	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter/strainers (Housing - Charging Pump Lube Oil)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Oil	Loss of Material	Work Control Process			G
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Flow Indicators	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Letdown Heat Exchanger (Channel Head)	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.8-b	3.3.1- 09	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Letdown Heat Exchanger (Shell)	LSI; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.E1.8-c	3.3.1- 15	B
Letdown Heat Exchanger (Tube Sheet)	LSI; PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.8-b	3.3.1- 09	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Letdown Heat Exchanger (Tubes)	LSI; PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.8-b	3.3.1- 09	B, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Level Indicators	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Lube Oil Reservoirs (Charging Pump)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Oil	Loss of Material	Work Control Process			G
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.2-f	3.1.1- 36	B, 4
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.2-f	3.1.1- 36	B, 3
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pulsation Dampeners	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Pumps (Charging Pump Lube Oil)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Oil	Loss of Material	Work Control Process			G
		Cast Iron	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Oil	Loss of Material	Work Control Process			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Regenerative Heat Exchanger (Channel Head)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Regenerative Heat Exchanger (Shell)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Regenerative Heat Exchanger (Tube Sheet)	PB	Stainless Steel	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Regenerative Heat Exchanger (Tubes)	PB	Stainless Steel	(E) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	VII.E1.7-c	3.3.1- 09	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Suction Stabilizers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.1-a	3.2.1- 15	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Sump Tanks (Charging Pump Seal Cooling)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.1-a	3.2.1- 15	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing (Charging Pump Lube Oil)	LSI; PB	Copper alloys	(E) Oil	Loss of Material	Work Control Process			F
			(I) Oil	Loss of Material	Work Control Process			F
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	IV.C2.4-b	3.1.1- 36	B, 4
					Inservice Inspection Program: Systems, Components and Supports	IV.C2.4-b	3.1.1- 36	B, 3
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
					Work Control Process			H
					Work Control Process	VII.C2.2-a	3.3.1- 15	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-10: Auxiliary Systems - Chemical and Volume Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Volume Control Tank	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-11: Auxiliary Systems - Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	LSI; PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.1-a	3.2.1- 15	B
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Sample Coolers (Shell)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-11: Auxiliary Systems - Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sample Coolers (Tubing)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.1-a	3.2.1- 15	B, 4
					Chemistry Control for Secondary Systems Program	V.A.1-a	3.2.1- 15	E, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
					Chemistry Control for Secondary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-11: Auxiliary Systems - Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.1-a	3.2.1- 15	B, 4
					Chemistry Control for Secondary Systems Program	V.A.1-a	3.2.1- 15	E, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
					Chemistry Control for Secondary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-11: Auxiliary Systems - Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Primary Systems Program	V.A.4-a	3.2.1- 15	B, 4
					Chemistry Control for Secondary Systems Program	V.A.4-a	3.2.1- 15	E, 4
				Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
					Chemistry Control for Secondary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-12: Auxiliary Systems - Primary Makeup Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	LSI; PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Primary Water Head Tank	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Pumps	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-12: Auxiliary Systems - Primary Makeup Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-13: Auxiliary Systems - Access Control Area Air Conditioning - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-14: Auxiliary Systems - Main Condensers Evacuation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	LSI; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.1-a	3.3.1- 05	A, 2
Ductwork	LSI; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.1-a	3.3.1- 05	A, 2
Fan/blower Housings	LSI; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.1-a	3.3.1- 05	A, 2
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.1-a	3.3.1- 05	A, 2
Valves	LSI; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.1-a	3.3.1- 05	A, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-15: Auxiliary Systems - Containment Air Recirculation and Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Air Recirculation Cooling Unit Coils	PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F3.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Containment Air Recirculation Cooling Unit Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.F3.1-a	3.3.1- 05	A, 2
Damper Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-15: Auxiliary Systems - Containment Air Recirculation and Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ductwork	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Flow Elements	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Pipe	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Tubing	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-15: Auxiliary Systems - Containment Air Recirculation and Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-16: Auxiliary Systems - Containment and Enclosure Building Purge - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F3.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F3.1-b	3.3.1- 02	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-16: Auxiliary Systems - Containment and Enclosure Building Purge - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flex Connections	PB	Neoprene	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F3.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F3.1-b	3.3.1- 02	A
			(I) Air	Change of Material Properties	Work Control Process	VII.F3.1-b	3.3.1- 02	A
				Cracking	Work Control Process	VII.F3.1-b	3.3.1- 02	A
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-17: Auxiliary Systems - Containment Penetration Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-17: Auxiliary Systems - Containment Penetration Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flex Connections	PB	Neoprene	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
			(I) Air	Change of Material Properties	Work Control Process	VII.F2.1-b	3.3.1- 02	A
				Cracking	Work Control Process	VII.F2.1-b	3.3.1- 02	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-18: Auxiliary Systems - Containment Post - Accident Hydrogen Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Detection Chambers	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Fan/blower Housings	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Flexible Hoses	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Flow Elements	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Flow Orifices	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Hydrogen Recombiner Housings	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-18: Auxiliary Systems - Containment Post - Accident Hydrogen Control - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Pipe	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Tubing	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Valves	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-19: Auxiliary Systems - Control Room Air Conditioning - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Compressor Casings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Gas	None	None			I, 10
Compressor Casings (Air Cooled Condenser)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G
Control Room Air Handling Units (Coils)	FLT; PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Gas	None	None			G
Control Room Air Handling Units (Housing)	FLT; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Control Room Filter Banks	FLT; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-19: Auxiliary Systems - Control Room Air Conditioning - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F1.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F1.1-b	3.3.1- 02	A
Fan/blower Housings (Air Cooled Condenser Unit)	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Fan/blower Housings (Control Room AHU)	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Filter Dryer	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G
Moisture Indicators	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G
Mufflers	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-19: Auxiliary Systems - Control Room Air Conditioning - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Pipe (Refrigeration)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G
Tubing	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Air	None	None			I, 12
Tubing (Refrigeration)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Valves	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Air	None	None			I, 12
Valves (Refrigeration)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-20: Auxiliary Systems - Control Element Drive Mechanism Cooling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CEDM Cooling Coils	PB	Stainless Steel	(E) Air	Loss of Material	Work Control Process			G, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-21: Auxiliary Systems - Diesel Generator Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F4.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F4.1-b	3.3.1- 02	A
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-21: Auxiliary Systems - Diesel Generator Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flex Connections	PB	Neoprene	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F4.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F4.1-b	3.3.1- 02	A
			(I) Air	Change of Material Properties	Work Control Process	VII.F4.1-b	3.3.1- 02	A
				Cracking	Work Control Process	VII.F4.1-b	3.3.1- 02	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-22: Auxiliary Systems - ESF Room Air Recirculation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
ESF Room Air Recirculation Unit Cooling Coils	PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F2.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-22: Auxiliary Systems - ESF Room Air Recirculation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
ESF Room Air Recirculation Unit Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Flex Connections	PB	Neoprene	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
			(I) Air	Change of Material Properties	Work Control Process	VII.F2.1-b	3.3.1- 02	A
				Cracking	Work Control Process	VII.F2.1-b	3.3.1- 02	A
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-23: Auxiliary Systems - Enclosure Building Filtration - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Damper Housings (In Millstone stack)	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	Infrequently Accessed Areas Inspection Program	VII.F2.1-a	3.3.1- 05	A, 2
			(I) Atmosphere/ Weather	Loss of Material	Infrequently Accessed Areas Inspection Program	VII.F2.1-a	3.3.1- 05	A, 2
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-23: Auxiliary Systems - Enclosure Building Filtration - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
Enclosure Building Filtration Filter Bank Housings	FLT; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	A, 2
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Flex Connections	PB	Neoprene	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
			(I) Air	Change of Material Properties	Work Control Process	VII.F2.1-b	3.3.1- 02	A
				Cracking	Work Control Process	VII.F2.1-b	3.3.1- 02	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-23: Auxiliary Systems - Enclosure Building Filtration - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Pipe (Below Ground)	PB	Carbon Steel	(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
			(I) Air	None	None			I, 10
Pipe (In Millstone stack)	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	Infrequently Accessed Areas Inspection Program	VII.F2.1-a	3.3.1- 05	A, 2
			(I) Atmosphere/ Weather	Loss of Material	Infrequently Accessed Areas Inspection Program	VII.F2.1-a	3.3.1- 05	A, 2
Tubing	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Air	None	None			I, 12
Valves	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-23: Auxiliary Systems - Enclosure Building Filtration - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Valves	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Air	None	None			I, 12

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-24: Auxiliary Systems - Fuel Handling Area Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
Flow Elements	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-25: Auxiliary Systems - Main Exhaust Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Filter Bank Housing	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-25: Auxiliary Systems - Main Exhaust Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	PB	Copper alloys	(E) Air	None	None			I, 12
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	None	None			I, 12
Tubing	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-26: Auxiliary Systems - Non-Radioactive Area Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cable Vault Recirc Unit Cooling Coils	LSI; PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Fan/blower Housings	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Air	None	None			I, 10
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-27: Auxiliary Systems - Process and Area Radiation Monitoring - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bolting	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Pipe	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Tubing	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11
Valves	PB	Stainless Steel	(E) Air	None	None			I, 11
			(I) Air	None	None			I, 11

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-28: Auxiliary Systems - Radwaste Area Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-29: Auxiliary Systems - Turbine Building Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-30: Auxiliary Systems - Vital Switchgear Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
DC SWGR A/C Unit Cooling Coils	PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
					Work Control Process	VII.C1.3-a	3.3.1- 17	E
DC SWGR A/C Unit Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Ductwork Joint Seals	PB	Dux Seal	(E) Air	Cracking	General Condition Monitoring			F
		Silicone rubber	(E) Air	Change of Material Properties	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
				Cracking	General Condition Monitoring	VII.F2.1-b	3.3.1- 02	A
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-30: Auxiliary Systems - Vital Switchgear Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
MCC A/C Units (Accumulator)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Compressor)	PB	Cast Iron	(E) Air	None	None			I, 10
			(I) Gas	None	None			I, 10
MCC A/C Units (Condenser coil)	PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Gas	None	None			I, 12
MCC A/C Units (Distributor)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Evaporator coil)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Filter/Dryer)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Housing)	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
MCC A/C Units (Receiver)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-30: Auxiliary Systems - Vital Switchgear Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
MCC A/C Units (Sight glass housing)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Tubing)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
MCC A/C Units (Valves)	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Gas	None	None			I, 12
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Tubing	PB	Copper alloys	(E) Air	None	None			I, 12
			(I) Air	None	None			I, 12
Valves	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Vital SWGR Cooling Unit Coils	HT; PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-30: Auxiliary Systems - Vital Switchgear Ventilation - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Vital SWGR Cooling Unit Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
West 480V LCR Cooling Unit Coils	HT; PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F1.2-a	3.3.1- 05	A, 2
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
West 480V LCR Cooling Unit Housings	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Drip Pans	EN	Stainless Steel	(E) Air	Loss of Material	General Condition Monitoring			G, 2
Fire Hydrants	PB	Cast Iron	(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Flame Arrestors	FB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Oil	Loss of Material	Tank Inspection Program	VII.G.7-a	3.3.1- 06	A, 14
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
Flex Connections	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Flow Indicators	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Nozzles	SP	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G
Nozzles	SP	PVC	(E) Air	None	None			F
			(I) Air	None	None			F
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.3-a	3.3.1- 05	C, 2
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Cast Iron	(E) Air	None	None			I, 6
			(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
					Buried Pipe Inspection Program	VII.C1.1-c	3.3.1- 29	E
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Pipe	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	Loss of Material	Fire Protection Program			G, 2
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
RCP Oil Collection Tanks	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.3-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Tank Inspection Program	VII.G.7-a	3.3.1- 06	A, 14
Retard Chambers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.3-a	3.3.1- 05	C, 2
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sprinkler Heads	PB; SP	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Strainers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.3-a	3.3.1- 05	C, 2
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Tubing	PB	Copper alloys	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.1-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Fire Protection Program			G, 2
Tubing	PB	Copper alloys	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Air	Loss of Material	Fire Protection Program			G, 2
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.3-a	3.3.1- 05	C, 2
Valves	PB	Cast Iron	(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
					Buried Pipe Inspection Program	VII.C1.1-c	3.3.1- 29	E
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Valves	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-31: Auxiliary Systems - Unit 2 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Cast Iron	(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Valves	PB	Copper alloys	(E) Air	None	None			G
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
			(I) Air	Loss of Material	Fire Protection Program			G, 2
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Water Motor Gongs	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	None	None			I, 6

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CO2 Storage Tank	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 13
			(I) Gas	None	None			G
CO2 Tank Cooling Coils	PB	Copper alloys	(E) Air	None	None			G
			(I) Gas	None	None			G
Coolant Heat Exchanger	HT; PB	Copper alloys	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Damper Housings	FB; PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Diesel Fuel Storage Tank	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.G.8-a	3.3.1- 22	B, 17
Drip Pans	EN	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ductwork	PB	Carbon Steel	(E) Air	None	None			I, 10
			(I) Air	None	None			I, 10
Exhaust Silencer	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	A, 2
Expansion Tank Overflow Container	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.4-a	3.3.1- 15	E
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	None	None			I, 6
Filter/strainers	FLT; PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A, 2
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
Filter/strainers	FLT; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Hydrants	PB	Cast Iron	(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Fire Protection RCP Oil Collection Tanks	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Tank Inspection Program	VII.G.7-a	3.3.1- 06	A, 14
Fire Water Storage Tank	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	Tank Inspection Program	VII.I.1-b	3.3.1- 05	A, 22
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A
			(I) Raw Water	Loss of Material	Tank Inspection Program	VII.G.6-b	3.3.1- 21	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flame Arrestors	FB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Tank Inspection Program	VII.G.7-a	3.3.1- 06	A, 14
Flex Connections	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Flexible Hoses	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Flow Switches	PB	Copper alloys	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Heater Unit	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-a	3.3.1- 06	C, 14
Hydropneumatic Tank	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Raw Water	Loss of Material	Tank Inspection Program	VII.G.6-b	3.3.1- 21	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Instrument Snubbers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Work Control Process	VII.G.6-a	3.3.1- 21	E
Level Indicators	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.4-a	3.3.1- 05	C
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	C
Lube Oil Cooler (Outer Shell)	HT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Lube Oil Cooler (Tubes)	HT; PB	Carbon Steel	(E) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-b	3.3.1- 06	A, 14
Nozzles	SP	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G
Nozzles	SP	PVC	(E) Air	None	None			F
			(I) Air	None	None			F
Odorizers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	None	None			I, 6
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Oil Mist Recovery Unit	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-a	3.3.1- 06	C, 14
Oil Reservoirs	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-b	3.3.1- 06	A, 14
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.G.8-a	3.3.1- 22	B, 17
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.1-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	A, 2
Pipe	PB	Cast Iron	(E) Air	None	None			I, 6
			(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
					Buried Pipe Inspection Program	VII.C1.1-c	3.3.1- 29	B
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.G.8-a	3.3.1- 22	B, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pumps (Diesel Coolant)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.3-a	3.3.1- 15	E
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Sprinkler Heads	PB; SP	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Fire Protection Program			G, 2
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-a	3.3.1- 21	A
Tubing	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-b	3.3.1- 06	A, 14
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Vacuum Limiter	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-b	3.3.1- 06	C, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Fire Protection Program	VII.H2.2-a	3.3.1- 05	A, 2
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.G.8-a	3.3.1- 22	B, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Cast Iron	(E) Atmosphere/ Weather	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
			(E) Damp Soil	Loss of Material	Buried Pipe Inspection Program	VII.C1.1-b	3.3.1- 18	B
					Buried Pipe Inspection Program	VII.C1.1-c	3.3.1- 29	B
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Valves	PB	Copper alloys	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
					Work Control Process	VII.G.6-b	3.3.1- 21	E
Valves	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	None	None			G
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	None	None			G
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Fire Protection Program	VII.G.6-b	3.3.1- 21	A
Vortex Breaker Assembly	PB; VS	Carbon Steel	(E) Raw Water	Loss of Material	Tank Inspection Program	VII.G.6-b	3.3.1- 21	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-32: Auxiliary Systems - Unit 3 Fire Protection - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Water Cooled Exhaust Manifold	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Water Manifold	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process	VII.G.7-b	3.3.1- 06	C, 14
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-33: Auxiliary Systems - Domestic Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Pipe	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
					Work Control Process	VII.C1.1-a	3.3.1- 29	E
Pipe	LSI; PB	PVC	(E) Air	None	None			F
			(I) Raw Water	None	None			F
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
					Work Control Process	VII.C1.2-a	3.3.1- 29	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Sea Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-33: Auxiliary Systems - Domestic Water - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Copper alloys	(E) Air	Loss of Material	General Condition Monitoring			G, 2
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
					Work Control Process	VII.C1.2-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Cooling Heat Exchangers (Channel)	HT; PB	Copper alloys	(E) Air	None	None			G
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Air Cooling Heat Exchangers (Shell)	HT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Air Cooling Heat Exchangers (Tubes)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
					Work Control Process			H
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Cooling Heat Exchangers (Tubesheet)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Air Intercoolers (Shell)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.3-a	3.3.1- 05	A, 2
Air Intercoolers (tubes)	PB	Copper alloys	(E) Air	Loss of Material	Work Control Process	VII.F2.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Air Start Distributors	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	A, 2
Expansion Joints	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Filter/strainers	FLT; PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter/strainers	FLT; PB	Aluminum	(E) Air	None	None			F
			(I) Air	None	None			F
Filter/strainers	FLT; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	C, 2
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
Governor Hydraulic Oil Boosters	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F4.2-a	3.3.1- 05	C, 2
Jacket Water Expansion Tanks	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2, 15
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	B
Jacket Water Heat Exchangers (Channel)	HT; PB	Copper alloys	(E) Air	None	None			G
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Jacket Water Heat Exchangers (Shell)	HT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	D
Jacket Water Heat Exchangers (Tubes)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
					Work Control Process			H
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Jacket Water Heat Exchangers (Tubesheet)	HT; PB	Copper alloys	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Level Indicators	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.2-a	3.3.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Lube Oil Heat Exchangers (Channel)	HT; PB	Copper alloys	(E) Air	None	None			G
			(I) Sea Water	Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Lube Oil Heat Exchangers (Shell)	HT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Lube Oil Heat Exchangers (Tubes)	HT; PB	Copper alloys	(E) Oil	Buildup of Deposit	Work Control Process			J, 14
				Loss of Material	Work Control Process			J, 14
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Heat Exchangers (Tubesheet)	HT; PB	Copper alloys	(E) Oil	Buildup of Deposit	Work Control Process			J, 14
				Loss of Material	Work Control Process			J, 14
			(I) Sea Water	Buildup of Deposit	Service Water System (Open-Cycle Cooling)	VII.C1.3-b	3.3.1- 17	B
				Loss of Material	Service Water System (Open-Cycle Cooling)	VII.C1.3-a	3.3.1- 17	B
					Work Control Process	VII.C1.3-a	3.3.1- 29	E
Lube Oil Heaters	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Oil Pans	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.H2.1-a	3.3.1- 15	B
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.D.1-a	3.3.1- 19	E, 2
Pipe	LSI; PB	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F4.2-a	3.3.1- 05	C, 2
Pipe	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.D.1-a	3.3.1- 19	E, 2
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.3-a	3.3.1- 15	B
Silencers	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	A, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Stand-By Jacket Coolant Heaters	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	D
Starting Air Tanks	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.2-a	3.3.1- 05	C, 2
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			J, 14
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-34: Auxiliary Systems - Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Turbochargers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.F4.1-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.3-a	3.3.1- 15	D
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	A, 2
Valves	PB	Copper alloys	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C1.3-a	3.3.1- 17	E
Valves	PB	Nickel-based alloys	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-35: Auxiliary Systems - Diesel Generator Fuel Oil - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Clean Oil Storage Tanks	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Diesel Fuel Oil Storage Tank	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	Tank Inspection Program	VII.H1.4-b	3.3.1- 23	A, 13
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Diesel Oil Supply tanks	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Filter/Strainers	FLT; LSI; PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 16, 17
		Stainless Steel	(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 16, 17
Flame Arrestors	FB	Aluminum	(E) Air	None	None			F
			(I) Air	None	None			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-35: Auxiliary Systems - Diesel Generator Fuel Oil - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Level Indicators	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	D, 17
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Pipe	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Pipe	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Atmosphere/ Weather	Loss of Material	Work Control Process	VII.H1.1-a	3.3.1- 05	A
Pumps	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Pumps	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.3-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Fuel Oil Chemistry			H, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-35: Auxiliary Systems - Diesel Generator Fuel Oil - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Tubing	LSI; PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Valves	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Valves	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.2-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Valves	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	A, 2
Valves	LSI; PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-35: Auxiliary Systems - Diesel Generator Fuel Oil - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.2-a	3.3.1- 05	A
			(I) Atmosphere/ Weather	Loss of Material	Work Control Process	VII.H1.2-a	3.3.1- 05	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Aftercoolers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Air Receivers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Aspirators	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Expansion Joints	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Expansion Joints	PB	Rubber	(E) Air	None	None			F
			(I) Air	None	None			F
Expansion Tanks	PB	Stainless Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
			(I) Treated Water	Cracking	Work Control Process			H
				Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter/strainers	FLT; PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	D, 17
Filter/strainers	FLT; PB	Aluminum	(E) Air	None	None			F
			(I) Oil	None	None			F, 14
Filter/strainers	FLT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	A, 2
Filter/strainers	FLT; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Flame Arrestors	FB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Flow Indicators	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Fuel Heaters	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 17, 21

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil Day Tanks	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Fuel Oil Storage Tanks	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	Tank Inspection Program	VII.H1.4-b	3.3.1- 23	A, 13
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Immersion Heaters	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.4-a	3.3.1- 15	E
Injectors	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Lube Oil Coolers (Channel)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Lube Oil Coolers (Shell)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.4-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Coolers (Tubes)	PB	Copper alloys	(E) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
			(I) Oil	Loss of Material	Work Control Process			J, 14
Lube Oil Coolers (Tubesheet)	PB	Copper alloys	(E) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
			(I) Oil	Loss of Material	Work Control Process			J, 14
Lubricators	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			G, 14
Oil Sumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Work Control Process			H
				Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Pipe	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Pipe	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Pipe	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Pipe	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.D.1-a	3.3.1- 19	E, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.1-a	3.3.1- 05	A
			(I) Atmosphere/ Weather	Loss of Material	Work Control Process	VII.H1.1-a	3.3.1- 05	A
Pulsation Dampeners	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.3-a	3.3.1- 15	E
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Radiators	PB	Aluminum	(E) Atmosphere/ Weather	None	None			F
			(I) Air	None	None			F
		Copper alloys	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Restricting Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Silencers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.3-a	3.3.1- 05	A, 2
Silencers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Silencers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Silencers	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			(I) Air	Loss of Material	Work Control Process	VII.H2.4-a	3.3.1- 05	A, 2
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Work Control Process			H
				Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Turbo Chargers	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.F4.1-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-36: Auxiliary Systems - Station Blackout Diesel Generator - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Work Control Process			H
				Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Valves	PB	Stainless Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Valves	PB	Stainless Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			G
			(I) Air	Loss of Material	Work Control Process			G, 2
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process	VII.F2.4-a	3.3.1- 05	C, 2
Valves	PB	Stainless Steel	(E) Air	None	None			G
			(I) Oil	Loss of Material	Work Control Process			G, 14
Valves	PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.H1.2-a	3.3.1- 05	A
			(I) Atmosphere/ Weather	Loss of Material	Work Control Process	VII.H1.2-a	3.3.1- 05	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-37: Auxiliary Systems - Security - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Coolers (channel head)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Coolers (Shell)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Coolers (tubes)	PB	Copper alloys	(E) Oil	Loss of Material	Work Control Process			J, 14
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Coolers (tubesheet)	PB	Copper alloys	(E) Oil	Loss of Material	Work Control Process			J, 14
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Diesel Fuel Oil Storage Tank	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Tank Inspection Program	VII.H2.2-a	3.3.1- 05	A, 2
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	B, 17
Fan/blower Housings	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.F4.1-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
Filter/strainers	FLT; PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-37: Auxiliary Systems - Security - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter/strainers	FLT; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H1.4-a	3.3.1- 07	D, 17
Filter/strainers	FLT; PB	Aluminum	(E) Air	None	None			F
			(I) Air	None	None			F
Heaters	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Oil Pans	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14
Pipe	PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-37: Auxiliary Systems - Security - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Fuel Oil Chemistry	VII.H2.5-a	3.3.1- 07	D, 17
Pumps	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Work Control Process	VII.H2.1-a	3.3.1- 15	E
Radiators	PB	Aluminum	(E) Air	None	None			F
		Copper alloys	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C1.3-a	3.3.1- 17	E
Tubing	PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Valves	PB	Copper alloys	(E) Air	None	None			G
			(I) Oil	Loss of Material	Fuel Oil Chemistry			G, 17
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Oil	Loss of Material	Work Control Process			J, 14

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-38: Auxiliary Systems - Clean Liquid Waste Processing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Degasifier After Cooler (Helicoil tubes)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 20
Degasifier Effluent Cooler (Shell)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.1-a	3.3.1- 15	D, 18
					Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	D, 18
Degasifier Effluent Cooler (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E, 18
Degasifier Effluent Cooler (Tubesheet)	PB	Stainless Steel	(E) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E, 18
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
Degasifier Preheater (Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program			G, 19

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-38: Auxiliary Systems - Clean Liquid Waste Processing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
PDT and Quench Tank Cooler (Shell)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
PDT and Quench Tank Cooler (Tubes and Tubesheet)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
					Work Control Process			H, 18
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E, 18
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Primary Drain Tank	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Pumps	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-38: Auxiliary Systems - Clean Liquid Waste Processing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Strainers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-39: Auxiliary Systems - Gaseous Waste Processing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Aftercoolers (Shell)	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.4-a	3.3.1- 15	D, 18
Aftercoolers (Tubes)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
			(I) Air	Loss of Material	Work Control Process			G, 2
Aftercoolers (Tubesheet)	PB	Stainless Steel	(E) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D, 18
			(I) Air	Loss of Material	Work Control Process			G, 2
Pipe	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.H2.2-a	3.3.1- 05	C, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-39: Auxiliary Systems - Gaseous Waste Processing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Air	Loss of Material	Work Control Process	VII.D.2-a	3.3.1- 19	E, 2
Waste Gas Compressor Seal Coolers	PB	Carbon Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VII.C2.3-a	3.3.1- 15	D, 18

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-40: Auxiliary Systems - Post Accident Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Accumulators (Flushing)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Accumulators (Nitrogen)	PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Bolting	LSI; PB	Low-alloy Steel	(E) Air	None	None			I, 6
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.E1.1-b	3.3.1- 14	A, 1
					General Condition Monitoring	VII.E1.1-b	3.3.1- 14	A, 1
Filter/strainers	FLT; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-40: Auxiliary Systems - Post Accident Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
Reservoir	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Sample Chambers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
Sample Chambers	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-40: Auxiliary Systems - Post Accident Sampling - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Work Control Process	VII.C2.2-a	3.3.1- 15	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Gas	None	None			G
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Air	Loss of Material	Work Control Process			G, 2

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.3.2-41: Auxiliary Systems - Station Sumps and Drains - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Pipe	LSI; PB	PVC	(E) Air	None	None			F
			(I) Raw Water	None	None			F
Pipe	LSI; PB	Carbon Steel	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Pumps	PB	Cast Iron	(E) Air	None	None			I, 6
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.5-a	3.3.1- 17	E
Pumps	PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.1-a	3.3.1- 17	E
Valves	FLB; LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E
Valves	FLB; LSI; PB	Copper alloys	(E) Air	Loss of Material	Work Control Process			G, 2
			(I) Raw Water	Loss of Material	Work Control Process	VII.C1.2-a	3.3.1- 17	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Notes for Tables 3.3.2-1 through 3.3.2-41:

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The Boric Acid Corrosion AMP includes specific inspections of reactor coolant pressure boundary and supporting systems components. The General Condition Monitoring AMP provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the Boric Acid Corrosion AMP.

2. The subject components are subject to a moisture-laden air and/or intermittently wetted environment.

3. Only applicable to ASME Class 1 components. Refer to Appendix C, Section C3.3.9, Flaw Initiation and Growth – Metals and Section C3.8, Loss of Pre-load for further information.

4. Cracking due to SCC is only applicable to stainless steel components exposed to temperatures greater than 140°F. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for further information.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Plant Specific Notes (cont.)

5. Only applicable to CASS components that are subject to temperatures in excess of 482°F. Refer to Appendix C, Section C3.10.3, Thermal Embrittlement – Metals for further information.

6. This component is not exposed externally to moisture-laden air or intermittent wetting. Therefore, NUREG-1801 Item VII.I.1-b is not applicable.

7. This component is not exposed internally to saturated air. Therefore, NUREG-1801 Item VII.D.3-a is not applicable.

8. This component is not exposed internally to saturated air. Therefore, NUREG-1801 Item VII.D.1-a is not applicable.

9. This component is not exposed internally to saturated air. Therefore, NUREG-1801 Item VII.D.2-a is not applicable.

10. NUREG-1801 Items VII.F1.1-a, VII.F2.1-a, VII.F3.1-a, VII.F4.1-a and similar items are not applicable since these ventilation system components are exposed to an indoor air environment and are not intermittently wetted.

11. NUREG-1801 Items VII.F1.4-a, VII.F2.4-a, VII.F3.4-a and similar items are not applicable since these ventilation system components are exposed to an indoor air environment and are not intermittently wetted.

12. NUREG-1801 Item VII.F1.2-a is not applicable since these ventilation system components are exposed to an indoor air environment and are not intermittently wetted.

13. The tank is supported on saddle-type steel supports and is not in contact with concrete or soil.

14. The oil environment is lubricating oil.

15. These tanks are not in the scope of the Tank Inspection Program since the tank volume is less than 100 gal.

16. The filter/strainers have cast iron housings. The strainer elements are stainless steel.

17. The oil environment is fuel oil.

18. Only the shell side of the heat exchanger/cooler, which performs a RBCCW system pressure boundary, is in the scope of license renewal.

19. Only the shell of the pre-heater, which can affect spatially-oriented safety-related SSCs upon its failure, is in the scope of license renewal.

20. Only the tube side of the vent condenser aftercooler, which performs a RBCCW system pressure boundary, is in the scope of license renewal.

21. The fuel heater is normally isolated and contains stagnant fuel oil.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Plant Specific Notes (cont.)

22. The loss of material aging effect is also applicable to the tank bottom due to the potentially adverse external environment. The Tank Inspection Program manages aging of the inaccessible portions of the tank bottom due to externally initiated loss of material.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.4.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.4, Steam and Power Conversion System. The systems, or portions of systems, which are addressed in this section, are described in the indicated sections.

- Main Steam System (Section 2.3.4.1)
- Extraction Steam System (Section 2.3.4.2)
- Feedwater System (Section 2.3.4.3)
- Condensate System (Section 2.3.4.4)
- Condensate Storage And Transfer System (Section 2.3.4.5)
- Condensate Demin Mixed Bed System (Section 2.3.4.6)
- Auxiliary Feedwater System (Section 2.3.4.7)
- Feedwater Heater Vents and Drains System (Section 2.3.4.8)
- Moisture Separation and Reheat System (Section 2.3.4.9)
- Plant Heating and Condensate Recovery System (Section 2.3.4.10)
- Secondary Chemical Feed System (Section 2.3.4.11)
- Turbine Gland Sealing System (Section 2.3.4.12)

Table 3.4.1, Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System, provides the summary of the programs evaluated in NUREG-1801 for the Steam and Power Conversion System component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.4.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Steam and Power Conversion Systems group.

Table 3.4.2-1, Main Steam - Aging Management Evaluation

Table 3.4.2-2, Extraction Steam - Aging Management Evaluation

Table 3.4.2-3, Feedwater - Aging Management Evaluation

Table 3.4.2-4, Condensate - Aging Management Evaluation

Table 3.4.2-5, Condensate Storage and Transfer - Aging Management Evaluation

Table 3.4.2-6, Condensate Demin Mixed Bed - Aging Management Evaluation

Table 3.4.2-7, Auxiliary Feedwater - Aging Management Evaluation

Table 3.4.2-8, Feedwater Heater Vents & Drains - Aging Management Evaluation

Table 3.4.2-9, Moisture Separation & Reheat - Aging Management Evaluation

Table 3.4.2-10, Plant Heating & Condensate Recovery - Aging Management Evaluation

Table 3.4.2-11, Secondary Chemical Feed - Aging Management Evaluation

Table 3.4.2-12, Turbine Gland Sealing - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections of Section 3.4.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.4.2.1.1, Main Steam System

Section 3.4.2.1.2, Extraction Steam System

Section 3.4.2.1.3, Feedwater System

Section 3.4.2.1.4, Condensate System

Section 3.4.2.1.5, Condensate Storage and Transfer System

Section 3.4.2.1.6, Condensate Demin Mixed Bed System

Section 3.4.2.1.7, Auxiliary Feedwater System

Section 3.4.2.1.8, Feedwater Heater Vents & Drains System

Section 3.4.2.1.9, Moisture Separation & Reheat System

Section 3.4.2.1.10, Plant Heating & Condensate Recovery System

Section 3.4.2.1.11, Secondary Chemical Feed System

Section 3.4.2.1.12, Turbine Gland Sealing System

3.4.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.4.2.1.1 Main Steam System

Materials

The materials of construction for the Main Steam System component types are:

- Carbon Steel

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Main Steam System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Steam
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Main Steam System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Main Steam System component types:

- Boric Acid Corrosion
- Chemistry Control for Secondary Systems Program
- Closed-Cycle Cooling Water System
- Flow-Accelerated Corrosion
- General Condition Monitoring
- Work Control Process

3.4.2.1.2 Extraction Steam System

Materials

The materials of construction for the Extraction Steam System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Extraction Steam System component types are exposed to the following environments:

- Air
- Steam

Aging Effects Requiring Management

The following aging effects, associated with the Extraction Steam System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Extraction Steam System component types:

- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion

3.4.2.1.3 Feedwater System

Materials

The materials of construction for the Feedwater System component types are:

- Carbon Steel
- Carbon Steel and Low-alloy Steel
- Low-alloy Steel
- Stainless Steel

Environment

The Feedwater System component types are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Feedwater System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Feedwater System component types:

- Boric Acid Corrosion
- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion
- General Condition Monitoring
- Work Control Process

3.4.2.1.4 Condensate System

Materials

The materials of construction for the Condensate System component types are:

- Carbon Steel
- Carbon Steel and Low-alloy Steel
- Cast Iron
- Rubber
- Stainless Steel

Environment

The Condensate System component types are exposed to the following environments:

- Air
- Steam
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Condensate System, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate System component types:

- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion
- Work Control Process

3.4.2.1.5 Condensate Storage and Transfer System

Materials

The materials of construction for the Condensate Storage and Transfer System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Condensate Storage and Transfer System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Gas
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Condensate Storage and Transfer System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate Storage and Transfer System component types:

- Chemistry Control for Secondary Systems Program

- General Condition Monitoring
- Tank Inspection Program
- Work Control Process

3.4.2.1.6 Condensate Demin Mixed Bed System

Materials

The materials of construction for the Condensate Demin Mixed Bed System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Condensate Demin Mixed Bed System component types are exposed to the following environments:

- Air
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Condensate Demin Mixed Bed System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate Demin Mixed Bed System component types:

- Chemistry Control for Secondary Systems Program
- General Condition Monitoring

3.4.2.1.7 Auxiliary Feedwater System

Materials

The materials of construction for the Auxiliary Feedwater System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Auxiliary Feedwater System component types are exposed to the following environments:

- Air
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Auxiliary Feedwater System, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Auxiliary Feedwater System component types:

- Chemistry Control for Secondary Systems Program
- General Condition Monitoring
- Work Control Process

3.4.2.1.8 Feedwater Heater Vents & Drains System

Materials

The materials of construction for the Feedwater Heater Vents & Drains System component types are:

- Carbon Steel
- Carbon Steel and Low-alloy Steel
- Copper alloys
- Stainless Steel

Environment

The Feedwater Heater Vents & Drains System component types are exposed to the following environments:

- Air
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Feedwater Heater Vents & Drains System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Feedwater Heater Vents & Drains System component types:

- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion
- Work Control Process

3.4.2.1.9 Moisture Separation & Reheat System

Materials

The materials of construction for the Moisture Separation & Reheat System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Moisture Separation & Reheat System component types are exposed to the following environments:

- Air
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Moisture Separation & Reheat System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Moisture Separation & Reheat System component types:

- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion

3.4.2.1.10 Plant Heating & Condensate Recovery System

Materials

The materials of construction for the Plant Heating & Condensate Recovery System component types are:

- Carbon Steel
- Carbon Steel and Low-alloy Steel
- Copper alloys
- Stainless Steel

Environment

The Plant Heating & Condensate Recovery System component types are exposed to the following environments:

- Air
- Atmosphere/Weather
- Steam
- Treated Water
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Plant Heating & Condensate Recovery System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Plant Heating & Condensate Recovery System component types:

- Chemistry Control for Secondary Systems Program
- Closed-Cycle Cooling Water System
- General Condition Monitoring
- Work Control Process

3.4.2.1.11 Secondary Chemical Feed System

Materials

The materials of construction for the Secondary Chemical Feed System component types are:

- Stainless Steel

Environment

The Secondary Chemical Feed System component types are exposed to the following environments:

- Air
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Secondary Chemical Feed System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Secondary Chemical Feed System component types:

- Chemistry Control for Secondary Systems Program
- Work Control Process

3.4.2.1.12 Turbine Gland Sealing System

Materials

The materials of construction for the Turbine Gland Sealing System component types are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Turbine Gland Sealing System component types are exposed to the following environments:

- Air

- Steam
- Treated Water and Steam

Aging Effects Requiring Management

The following aging effects, associated with the Turbine Gland Sealing System, require management:

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Gland Sealing System component types:

- Chemistry Control for Secondary Systems Program
- Flow-Accelerated Corrosion

3.4.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Steam and Power Conversion Systems, those programs are addressed in the following sections.

3.4.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed in Section 4.3, Metal Fatigue.

3.4.2.2.2 Loss of Material due to General, Pitting, and Crevice Corrosion

The loss of material due to general corrosion, pitting, and crevice corrosion for steam and power conversion systems components is managed by control of water chemistry through the Chemistry Control for Secondary Systems Program.

In lieu of a one-time inspection, the 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. The Work Control Process 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 Secondary Systems Program.

3.4.2.2.3 Loss of Material due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

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 backup water supply piping and components are evaluated for the effects of aging with the Unit 2 Fire Protection System in Section 3.3, Aging Management of Auxiliary Systems.

Based on the above, the auxiliary feedwater pump suction piping was not evaluated for aging effects considering the back-up water supply environment.

3.4.2.2.4 General Corrosion

General corrosion is applicable to carbon steel, low-alloy steel, and cast iron components in an air environment only when exposed to intermittent wetting (refer to Appendix C, Section C3.7.15, General Corrosion – Metals). Loss of material due to general corrosion of external surfaces is managed by the General Condition Monitoring AMP.

3.4.2.2.5.1 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The auxiliary feedwater pumps are not equipped with oil coolers. Therefore, this item is not applicable.

3.4.2.2.5.2 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

There are no underground, carbon steel components associated with the Auxiliary Feedwater System. Therefore, this item is not applicable.

3.4.2.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components

The commitment to quality assurance for non-safety-related SSCs during the period of extended operation is described in Section B1.3, Quality Assurance Program and Administrative Controls.

3.4.2.3 TIME-LIMITED AGING ANALYSIS

The TLAA identified below is associated with the Steam and Power Conversion Systems. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Fatigue (Section 4.3, Metal Fatigue)

3.4.3 CONCLUSION

The Steam and Power Conversion Systems components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Steam and Power Conversion Systems components are identified in the summary tables and Section 3.4.2.1.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the programs provided in Appendix B, the effects of aging associated with the Steam and Power Conversion System components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.4.4 REFERENCES

None

Results Tables: Steam and Power Conversion Systems

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1- 01	Piping and fittings in main feedwater line, steam line and auxiliary feedwater (AFW) piping (PWR only)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue.
3.4.1- 02	Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except main steam system)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. Aging effects are managed by the Chemistry Control for Secondary Systems Program. This program takes some exceptions to the NUREG-1801 AMP. Further evaluation is documented in Subsection 3.4.2.2.2.
3.4.1- 03	AFW piping	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. Untreated water from the back-up water supply is isolated from the AFW piping.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1- 04	Oil coolers in AFW system (lubricating oil side possibly contaminated with water)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion and MIC	Plant specific	Yes, plant specific	NUREG-1801 item is not applicable. There are no oil coolers in the Auxiliary Feedwater System.
3.4.1- 05	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Aging effects are managed by the General Condition Monitoring program. Further evaluation is documented in Subsection 3.4.2.2.4
3.4.1- 06	Carbon steel piping and valve bodies	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Consistent with NUREG-1801. Aging effects are managed by the Flow-Accelerated Corrosion program. This program takes some exceptions to the NUREG-1801 AMP.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1- 07	Carbon steel piping and valve bodies in main steam system	Loss of material due to pitting and crevice corrosion	Water chemistry	No	Consistent with NUREG-1801. Aging effects are managed by the Chemistry Control for Secondary Systems Program. This program takes some exceptions to the NUREG-1801 AMP.
3.4.1- 08	Closure bolting in high-pressure or high-temperature systems	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.	Bolting integrity	No	Not consistent with NUREG-1801. Bolting in the steam and power conversion systems is not subject to wetted conditions, therefore, loss of material due to general corrosion is not expected (refer to Appendix C, Section C3.7.15, General Corrosion – Metals). Additionally, cracking for bolting in steam and power conversion systems is not identified as an aging effect requiring management (refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals).

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1- 09	Heat exchangers and coolers/ condensers serviced by open-cycle cooling water	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	No	NUREG-1801 item is not applicable. There are no in-scope components in the steam and power conversion systems that are serviced by open-cycle cooling systems.
3.4.1- 10	Heat exchangers and coolers/ condensers serviced by closed-cycle cooling water	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-cycle cooling water system	No	Consistent with NUREG-1801. Loss of material for components in a closed-cycle cooling environment are managed by the Closed-Cycle Cooling Water System aging management program. This program takes some exceptions to the NUREG-1801 AMP. 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 Program or the Work Control Process.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1- 11	External surface of aboveground condensate storage tank	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground carbon steel tanks	No	Consistent with NUREG-1801. Aging effects are managed by the Tank Inspection Program.
3.4.1- 12	External surface of buried condensate storage tank and AFW piping	Loss of material due to general, pitting, and crevice corrosion and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	NUREG-1801 item is not applicable. There are no underground, carbon steel components associated with the Auxiliary Feedwater System.
3.4.1- 13	External surface of carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Not consistent with NUREG-1801. Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion and General Condition Monitoring AMPs.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensing Pots	PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.1-a	3.4.1- 07	B
Expansion Joints	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Flexible Hoses	PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Flow Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Moisture Separators / Reheaters (Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VIII.H.1-a	3.4.1- 13	A, 1
					General Condition Monitoring	VIII.H.1-a	3.4.1- 13	A, 1
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.1-a	3.4.1- 07	B
					Flow-Accelerated Corrosion	VIII.B1.1-c	3.4.1- 06	B
Quench Tank Heat Exchangers (Shell)	PB	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System	VIII.F.4-e	3.4.1- 10	B
Quench Tank Heat Exchangers (Tubes)	PB	Stainless Steel	(E) Treated Water	Cracking	Closed-Cycle Cooling Water System			H, 3
				Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.F.4-a	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Quench Tank Heat Exchangers (Tubesheet)	PB	Stainless Steel	(E) Treated Water	Cracking	Closed-Cycle Cooling Water System			H, 3
				Loss of Material	Closed-Cycle Cooling Water System	VII.C2.2-a	3.3.1- 15	D
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.F.4-a	3.4.1- 02	B
Silencers	SS	Carbon Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Air	Loss of Material	Work Control Process			G
Steam Traps	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.1-a	3.4.1- 07	D
					Flow-Accelerated Corrosion	VIII.B1.1-c	3.4.1- 06	D
Strainers	FLT; LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.1-a	3.4.1- 07	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Turbine Casings	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D
					Work Control Process	VIII.A.1-a	3.4.1- 06	E
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VIII.H.1-a	3.4.1- 13	A, 1
					General Condition Monitoring	VIII.H.1-a	3.4.1- 13	A, 1
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.2-a	3.4.1- 07	B
					Flow-Accelerated Corrosion	VIII.B1.2-b	3.4.1- 06	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-1: Steam and Power Conversion System - Main Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Valves (Atmospheric dumps and main steam safety/relief)	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.A.2-a	3.4.1- 06	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-2: Steam and Power Conversion System - Extraction Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Joints	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.1-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.C.1-a	3.4.1- 06	B
Steam Traps	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.1-b	3.4.1- 02	D
					Flow-Accelerated Corrosion	VIII.C.1-a	3.4.1- 06	D
Strainers	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.1-b	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-2: Steam and Power Conversion System - Extraction Steam - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.C.2-a	3.4.1- 06	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-3: Steam and Power Conversion System - Feedwater - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Flow Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Heaters (Feedwater Heater Channel Head)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-3: Steam and Power Conversion System - Feedwater - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heaters (Feedwater Heater Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.E.1-a	3.4.1- 06	D
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VIII.H.1-a	3.4.1- 13	A, 1
					General Condition Monitoring	VIII.H.1-a	3.4.1- 13	A, 1
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.1-c	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.D1.1-a	3.4.1- 06	B
Pumps	LSI; PB	Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.3-a	3.4.1- 02	B
					Work Control Process			H

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-3: Steam and Power Conversion System - Feedwater - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VIII.H.1-a	3.4.1- 13	A, 1
					General Condition Monitoring	VIII.H.1-a	3.4.1- 13	A, 1
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.D1.2-a	3.4.1- 06	B
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-4: Steam and Power Conversion System - Condensate - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensers (Main Condenser Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.B1.1-a	3.4.1- 07	D
Drains Coolers (Channel Head)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
Drains Coolers (Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
Expansion Joints	LSI; PB	Rubber	(E) Air	None	None			F
			(I) Treated Water	Change of Material Properties	Work Control Process			F
				Cracking	Work Control Process			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-4: Steam and Power Conversion System - Condensate - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Flow Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-e	3.4.1- 10	E
Heat Exchanger Steam Jet Air Ejectors (Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
Heaters (Feedwater Heater Channel Head)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-4: Steam and Power Conversion System - Condensate - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heaters (Feedwater Heater Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.E.1-a	3.4.1- 06	D
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.E.1-a	3.4.1- 06	B
Pumps	LSI; PB	Cast Iron	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.3-a	3.4.1- 02	B
					Work Control Process	VIII.E.1-a	3.4.1- 06	E
Steam Packing Exhauster (Channel Head)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-4: Steam and Power Conversion System - Condensate - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Packing Exhauster (Shell)	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-a	3.4.1- 02	B
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-e	3.4.1- 10	E
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.E.2-a	3.4.1- 06	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-5: Steam and Power Conversion System - Condensate Storage and Transfer - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensate Storage Tank	PB	Carbon Steel and Low-alloy Steel	(E) Atmosphere/ Weather	Loss of Material	Tank Inspection Program	VIII.G.4-c	3.4.1- 11	A, 2, 5
			(I) Gas	Loss of Material	Work Control Process			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.4-a	3.4.1- 02	B
Pipe	PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	B
Pipe	PB	Carbon Steel and Low-alloy Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			H
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	B
Rupture Disks	PB	Stainless Steel	(E) Atmosphere/ Weather	Loss of Material	Work Control Process			G, 2
			(I) Gas	None	None			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-5: Steam and Power Conversion System - Condensate Storage and Transfer - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Siphon Breaker	RF	Carbon Steel and Low-alloy Steel	(E) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	D
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	D
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.4-e	3.4.1- 10	E
Valves	PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.2-b	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-6: Steam and Power Conversion System - Condensate Demin Mixed Bed - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	B
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.2-b	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-7: Steam and Power Conversion System - Auxiliary Feedwater - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Flow Orifices	PB; RF	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Pipe	PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.1-c	3.4.1- 02	B
Pumps	PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.2-a	3.4.1- 02	B
Tubing	PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-7: Steam and Power Conversion System - Auxiliary Feedwater - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Turbine Casings	PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.2-a	3.4.1- 02	B
					Work Control Process			H
Valves	PB	Carbon Steel and Low-alloy Steel	(E) Air	Loss of Material	General Condition Monitoring	VIII.H.1-b	3.4.1- 05	A, 2
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.3-a	3.4.1- 02	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-8: Steam and Power Conversion System - Feedwater Heater Vents & Drains - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensing Pots	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.1-c	3.4.1- 02	D
Expansion Joints	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-8: Steam and Power Conversion System - Feedwater Heater Vents & Drains - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Gland Seal Coolers (Coils)	LSI; PB	Copper alloys	(E) Treated Water	Loss of Material	Work Control Process			F
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program			F
Heater Drains Tank	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.1-c	3.4.1- 02	D
Level Indicators	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.1-c	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-8: Steam and Power Conversion System - Feedwater Heater Vents & Drains - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.1-c	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.D1.1-a	3.4.1- 06	B
Pumps	LSI; PB	Carbon Steel	(E) Air	None	None			I, 4
			(I) Treated Water	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.3-a	3.4.1- 02	B
Restricting Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-8: Steam and Power Conversion System - Feedwater Heater Vents & Drains - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.D1.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.D1.2-a	3.4.1- 06	B
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-9: Steam and Power Conversion System - Moisture Separation & Reheat - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Condensing Pots	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Drain Pots	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Drain Tanks	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-9: Steam and Power Conversion System - Moisture Separation & Reheat - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Elements	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D
					Flow-Accelerated Corrosion	VIII.A.1-a	3.4.1- 06	B
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-9: Steam and Power Conversion System - Moisture Separation & Reheat - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.2-b	3.4.1- 02	D
					Flow-Accelerated Corrosion	VIII.A.2-a	3.4.1- 06	B

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-10: Steam and Power Conversion System - Plant Heating & Condensate Recovery - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heating and Ventilation Units (coils)	LSI; PB	Copper alloys	(E) Air	None	None			F
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program			F
Heating Coils	LSI; PB	Copper alloys	(E) Air	None	None			F
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program			F
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			H
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D
Reservoir	LSI; PB	Carbon Steel	(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			H
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.E.1-b	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-10: Steam and Power Conversion System - Plant Heating & Condensate Recovery - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sample Coolers (Tubes)	PB	Copper alloys	(E) Treated Water	Loss of Material	Work Control Process			F
			(I) Treated Water	Loss of Material	Closed-Cycle Cooling Water System			F
Steam Traps	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			H
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.1-b	3.4.1- 02	D
Strainers	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.C.1-b	3.4.1- 02	D
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water and Steam	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Chemistry Control for Secondary Systems Program	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-10: Steam and Power Conversion System - Plant Heating & Condensate Recovery - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(E) Atmosphere/ Weather	Loss of Material	General Condition Monitoring			H
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.2-b	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-11: Steam and Power Conversion System - Secondary Chemical Feed - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Work Control Process	VIII.G.5-c	3.4.1- 10	E
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Treated Water	Cracking	Chemistry Control for Secondary Systems Program			H, 3
				Loss of Material	Work Control Process	VIII.G.5-c	3.4.1- 10	E

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-12: Steam and Power Conversion System - Turbine Gland Sealing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow Orifices	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Pipe	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.A.1-a	3.4.1- 06	B
Tubing	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.4.2-12: Steam and Power Conversion System - Turbine Gland Sealing - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.2-b	3.4.1- 02	B
					Flow-Accelerated Corrosion	VIII.A.2-a	3.4.1- 06	B
Valves	LSI; PB	Stainless Steel	(E) Air	None	None			G
			(I) Steam	Cracking	Chemistry Control for Secondary Systems Program			G, 3
				Loss of Material	Chemistry Control for Secondary Systems Program			G
Water Pot	LSI; PB	Carbon Steel and Low-alloy Steel	(E) Air	None	None			I, 4
			(I) Treated Water and Steam	Loss of Material	Chemistry Control for Secondary Systems Program	VIII.A.1-b	3.4.1- 02	D

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Notes for Tables 3.4.2-1 through 3.4.2-12

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The Boric Acid Corrosion AMP includes specific inspections of reactor coolant pressure boundary and supporting systems components. The General Condition Monitoring AMP provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the Boric Acid Corrosion AMP.

2. The subject components are subject to a moisture-laden air and/or intermittently wetted environment.

3. Cracking due to SCC is only applicable to stainless steel components exposed to temperatures greater than 140°F. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for further information.

4. The external surface temperature of this component is high enough to preclude condensation. Additionally, this component is not exposed to intermittent wetting. Therefore, NUREG-1801 Item VIII.H.1-b is not applicable.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Plant Specific Notes (cont.)

5. The loss of material aging effect is also applicable to the tank bottom due to the potentially adverse external environment. The Tank Inspection Program manages aging of the inaccessible portions of the tank bottom due to externally initiated loss of material.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

3.5 AGING MANAGEMENT OF CONTAINMENT, STRUCTURES AND COMPONENT SUPPORTS

3.5.1 INTRODUCTION

This section provides the results of the aging management review for those structures and component supports identified in Section 2.4, Structures. The structures, which are addressed in this section, are described in the indicated sections.

- Containment (Section 2.4.1)
- Structures and Structural Components (Section 2.4.2), which include,
  - Unit 2 Containment Enclosure Building (Section 2.4.2.1)
  - Unit 2 Auxiliary Building (Section 2.4.2.2)
  - Unit 2 Warehouse Building (Section 2.4.2.3)
  - Unit 2 Turbine Building (Section 2.4.2.4)
  - Unit 1 Turbine Building (Section 2.4.2.5)
  - Unit 1 Control Room and Radwaste Treatment Building (Section 2.4.2.6)
  - Unit 2 Fire Pump House (Section 2.4.2.7)
  - Unit 3 Fire Pump House (Section 2.4.2.8)
  - SBO Diesel Generator Enclosure and Fuel Oil Tank Vault (Section 2.4.2.9)
  - Unit 2 Condensate Polishing Facility and Warehouse No. 5 (Section 2.4.2.10)
  - Security Diesel Generator Enclosure (Section 2.4.2.11)
  - Stack Monitoring Equipment Building (Section 2.4.2.12)
  - Millstone Stack (Section 2.4.2.13)
  - Switchyard Control House (Section 2.4.2.14)
  - Retaining Wall (Section 2.4.2.15)
  - 345kV Switchyard (Section 2.4.2.16)
  - Unit 2 Intake Structure (Section 2.4.2.17)
  - Sea Walls (Section 2.4.2.18)
  - Unit 2 Discharge Tunnel and Discharge Structure (Section 2.4.2.19)
  - Unit 2 Bypass Line (Section 2.4.2.20)
  - Tank Foundations (Section 2.4.2.21)
  - Yard Structures (Section 2.4.2.22)
- NSSS Equipment Supports (Section 2.4.3)
- General Structural Supports (Section 2.4.4)

- Miscellaneous Structural Commodities (Section 2.4.5)
- Load Handling Cranes and Devices (Section 2.4.6)

Table 3.5.1, Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports, provides the summary of the programs evaluated in NUREG-1801 for the Structures and Component Support component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.5.2 RESULTS

The following tables summarize the results of the aging management review for the components in the structures and component supports group:

Table 3.5.2-1, Unit 2 Containment - Aging Management Evaluation

Table 3.5.2-2, Unit 2 Containment Enclosure Building - Aging Management Evaluation

Table 3.5.2-3, Unit 2 Auxiliary Building - Aging Management Evaluation

Table 3.5.2-4, Unit 2 Warehouse Building - Aging Management Evaluation

Table 3.5.2-5, Unit 2 Turbine Building - Aging Management Evaluation

Table 3.5.2-6, Unit 1 Turbine Building - Aging Management Evaluation

Table 3.5.2-7, Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation

Table 3.5.2-8, Unit 2 Fire Pump House - Aging Management Evaluation

Table 3.5.2-9, Unit 3 Fire Pump House - Aging Management Evaluation

Table 3.5.2-10, SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation

Table 3.5.2-11, Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation

Table 3.5.2-12, Security Diesel Generator Enclosure - Aging Management Evaluation

Table 3.5.2-13, Stack Monitoring Equipment Building - Aging Management Evaluation

Table 3.5.2-14, Millstone Stack - Aging Management Evaluation

Table 3.5.2-15, Switchyard Control House - Aging Management Evaluation

Table 3.5.2-16, Retaining Wall - Aging Management Evaluation

Table 3.5.2-17, 345kV Switchyard - Aging Management Evaluation

Table 3.5.2-18, Unit 2 Intake Structure - Aging Management Evaluation

Table 3.5.2-19, Sea Walls - Aging Management Evaluation

Table 3.5.2-20, Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation

Table 3.5.2-21, Unit 2 Bypass Line - Aging Management Evaluation

Table 3.5.2-22, Tank Foundations - Aging Management Evaluation

Table 3.5.2-23, Yard Structures - Aging Management Evaluation

Table 3.5.2-24, NSSS Equipment Supports - Aging Management Evaluation

Table 3.5.2-25, General Structural Supports - Aging Management Evaluation

Table 3.5.2-26, Miscellaneous Structural Commodities - Aging Management Evaluation

Table 3.5.2-27, Load Handling Cranes and Devices - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above structures in the following subsections of Section 3.5.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.5.2.1.1, Containment

Section 3.5.2.1.2, Unit 2 Containment Enclosure Building

Section 3.5.2.1.3, Unit 2 Auxiliary Building

Section 3.5.2.1.4, Unit 2 Warehouse Building

Section 3.5.2.1.5, Unit 2 Turbine Building

Section 3.5.2.1.6, Unit 1 Turbine Building

Section 3.5.2.1.7, Unit 1 Control Room and Radwaste Treatment Building

Section 3.5.2.1.8, Unit 2 Fire Pump House

Section 3.5.2.1.9, Unit 3 Fire Pump House

Section 3.5.2.1.10, SBO Diesel Generator Enclosure & Fuel Oil Tank Vault

Section 3.5.2.1.11, Unit 2 Condensate Polishing Facility and Warehouse No. 5

Section 3.5.2.1.12, Security Diesel Generator Enclosure

Section 3.5.2.1.13, Stack Monitoring Equipment Building

Section 3.5.2.1.14, Millstone Stack

Section 3.5.2.1.15, Switchyard Control House

Section 3.5.2.1.16, Retaining Wall

Section 3.5.2.1.17, 345kV Switchyard

Section 3.5.2.1.18, Unit 2 Intake Structure

Section 3.5.2.1.19, Sea Walls

Section 3.5.2.1.20, Unit 2 Discharge Tunnel and Discharge Structure

Section 3.5.2.1.21, Unit 2 Bypass Line

Section 3.5.2.1.22, Tank Foundations

Section 3.5.2.1.23, Yard Structures

Section 3.5.2.1.24, NSSS Equipment Supports

Section 3.5.2.1.25, General Structural Supports

Section 3.5.2.1.26, Miscellaneous Structural Commodities

Section 3.5.2.1.27, Load Handling Cranes and Devices

3.5.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.5.2.1.1 Containment

Materials

The materials of construction for the Containment components are:

- Carbon Steel
- Concrete
- Silicone Rubber
- Stainless Steel
- Thiokol polysulfide

Environment

The Containment components are exposed to the following environments:

- Air
- Borated Water Leakage
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Containment, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Containment components:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring
- Inservice Inspection Program: Containment Inspections
- Structures Monitoring Program
- Work Control Process

3.5.2.1.2 Unit 2 Containment Enclosure Building

Materials

The materials of construction for the Unit 2 Containment Enclosure Building structural members are:

- Carbon Steel
- Concrete
- Sealants

Environment

The Unit 2 Containment Enclosure Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Containment Enclosure Building, require management:

- Change of Material Properties

- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Containment Enclosure Building structural members:

- Boric Acid Corrosion
- General Condition Monitoring
- Structures Monitoring Program

3.5.2.1.3 Unit 2 Auxiliary Building

Materials

The materials of construction for the Unit 2 Auxiliary Building structural members are:

- Aluminum
- Boraflex
- Carbon Steel
- Concrete
- Rubber
- Stainless Steel
- Teflon

Environment

The Unit 2 Auxiliary Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Raw Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Auxiliary Building, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Auxiliary Building structural members:

- Boraflex Monitoring
- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring
- Structures Monitoring Program
- Work Control Process

3.5.2.1.4 Unit 2 Warehouse Building

Materials

The materials of construction for the Unit 2 Warehouse Building structural members are:

- Carbon Steel
- Concrete
- Stainless Steel

Environment

The Unit 2 Warehouse Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Warehouse Building, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Warehouse Building structural members:

- Structures Monitoring Program

3.5.2.1.5 Unit 2 Turbine Building

Materials

The materials of construction for the Unit 2 Turbine Building structural members are:

- Carbon Steel
- Concrete
- Sealants
- Teflon

Environment

The Unit 2 Turbine Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Raw Water
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Turbine Building, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Turbine Building structural members:

- Structures Monitoring Program
- Work Control Process

3.5.2.1.6 Unit 1 Turbine Building

Materials

The materials of construction for the Unit 1 Turbine Building structural members are:

- Carbon Steel
- Concrete

Environment

The Unit 1 Turbine Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 1 Turbine Building, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 1 Turbine Building structural members:

- Structures Monitoring Program

3.5.2.1.7 Unit 1 Control Room and Radwaste Treatment Building

Materials

The materials of construction for the Unit 1 Control Room and Radwaste Treatment Building structural members are:

- Carbon Steel
- Concrete
- Teflon

Environment

The Unit 1 Control Room and Radwaste Treatment Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 1 Control Room and Radwaste Treatment Building, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 1 Control Room and Radwaste Treatment Building structural members:

- Structures Monitoring Program

3.5.2.1.8 Unit 2 Fire Pump House

The Unit 2 Fire Pump House is a shared structure and the aging management review results presented here and in Table 3.5.2-8, Unit 2 Fire Pump House - Aging Management Evaluation are duplicated in the Millstone Unit 3 License Renewal Application.

Materials

The materials of construction for the Unit 2 Fire Pump House structural members are:

- Carbon Steel
- Concrete

Environment

The Unit 2 Fire Pump House structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Fire Pump House structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Fire Pump House structural members:

- Structures Monitoring Program

3.5.2.1.9 Unit 3 Fire Pump House

The Unit 3 Fire Pump House is a shared structure and the aging management review results presented here and in Table 3.5.2-9, Unit 3 Fire Pump House - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Unit 3 Fire Pump House structural members are:

- Carbon Steel
- Concrete

Environment

The Unit 3 Fire Pump House structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 3 Fire Pump House structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 3 Fire Pump House structural members:

- Structures Monitoring Program

3.5.2.1.10 SBO Diesel Generator Enclosure & Fuel Oil Tank Vault

The SBO Diesel Generator Enclosure & Fuel Oil Tank Vault is a shared structure and the aging management review results presented here and in Table 3.5.2-10, SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the SBO Diesel Generator Enclosure & Fuel Oil Tank Vault structural members are:

- Aluminum
- Carbon Steel
- Concrete

Environment

The SBO Diesel Generator Enclosure & Fuel Oil Tank Vault structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the SBO Diesel Generator Enclosure & Fuel Oil Tank Vault structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the SBO Diesel Generator Enclosure & Fuel Oil Tank Vault structural members:

- Structures Monitoring Program

3.5.2.1.11 Unit 2 Condensate Polishing Facility and Warehouse No. 5

The Unit 2 Condensate Polishing Facility and Warehouse No. 5 is a shared structure and the aging management review results presented here and in Table 3.5.2-11, Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Unit 2 Condensate Polishing Facility and Warehouse No. 5 structural members are:

- Carbon Steel
- Concrete

Environment

The Unit 2 Condensate Polishing Facility and Warehouse No. 5 structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Condensate Polishing Facility and Warehouse No. 5 structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Condensate Polishing Facility and Warehouse No. 5 structural members:

- Structures Monitoring Program

3.5.2.1.12 Security Diesel Generator Enclosure

The Security Diesel Generator Enclosure is a shared structure and the aging management review results presented here and in Table 3.5.2-12, Security Diesel Generator Enclosure - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Security Diesel Generator Enclosure structural members are:

- Aluminum
- Carbon Steel
- Concrete
- Wood

Environment

The Security Diesel Generator Enclosure structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Security Diesel Generator Enclosure structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Security Diesel Generator Enclosure structural members:

- Structures Monitoring Program

3.5.2.1.13 Stack Monitoring Equipment Building

The Stack Monitoring Equipment Building is a shared structure and the aging management review results presented here and in Table 3.5.2-13, Stack Monitoring Equipment Building - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Stack Monitoring Equipment Building structural members are:

- Concrete

Environment

The Stack Monitoring Equipment Building structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Stack Monitoring Equipment Building structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Stack Monitoring Equipment Building structural members:

- Structures Monitoring Program

3.5.2.1.14 Millstone Stack

The Millstone Stack is a shared structure and the aging management review results presented here and in Table 3.5.2-14, Millstone Stack - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Millstone Stack structural members are:

- Carbon Steel
- Concrete

Environment

The Millstone Stack structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Millstone Stack structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Millstone Stack structural members:

- Infrequently Accessed Areas Inspection Program
- Structures Monitoring Program

3.5.2.1.15 Switchyard Control House

The Switchyard Control House is a shared structure and the aging management review results presented here and in Table 3.5.2-15, Switchyard Control House - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Switchyard Control House structural members are:

- Carbon Steel
- Concrete

Environment

The Switchyard Control House structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Switchyard Control House structural members, require management:

- Change of Material Properties
- Cracking

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Switchyard Control House structural members:

- Structures Monitoring Program

3.5.2.1.16 Retaining Wall

Materials

The materials of construction for the Retaining Wall structural members are:

- Concrete

Environment

The Retaining Wall structural members are exposed to the following environments:

- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Retaining Wall structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Retaining Wall structural members:

- Structures Monitoring Program

3.5.2.1.17 345kV Switchyard

The 345kV Switchyard is a shared structure and the aging management review results presented here and in Table 3.5.2-17, 345kV Switchyard - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the 345kV Switchyard structural members are:

- Carbon Steel
- Concrete

Environment

The 345kV Switchyard structural members are exposed to the following environments:

- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the 345kV Switchyard structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the 345kV Switchyard structural members:

- Structures Monitoring Program

3.5.2.1.18 Unit 2 Intake Structure

Materials

The materials of construction for the Unit 2 Intake Structure structural members are:

- Carbon Steel
- Concrete
- Stainless Steel

Environment

The Unit 2 Intake Structure structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Sea Water
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Intake Structure, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Intake Structure structural members:

- Structures Monitoring Program
- Infrequently Accessed Areas Inspection Program

3.5.2.1.19 Sea Walls

Materials

The materials of construction for the Sea Walls structural members are:

- Concrete

Environment

The Sea Walls structural members are exposed to the following environments:

- Atmosphere/Weather
- Sea Water
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Sea Walls, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Sea Walls structural members:

- Structures Monitoring Program

3.5.2.1.20 Unit 2 Discharge Tunnel and Discharge Structure

Materials

The materials of construction for the Unit 2 Discharge Tunnel and Discharge Structure structural members are:

- Concrete

Environment

The Unit 2 Discharge Tunnel and Discharge Structure structural members are exposed to the following environments:

- Atmosphere/Weather
- Sea Water
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 Discharge Tunnel and Discharge Structure, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 Discharge Tunnel and Discharge Structure structural members:

- Structures Monitoring Program

3.5.2.1.21 Unit 2 Bypass Line

Materials

The materials of construction for the Unit 2 bypass line structural members are:

- Concrete

Environment

The Unit 2 bypass line structural members are exposed to the following environments:

- Sea Water
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Unit 2 bypass line structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Unit 2 bypass line structural members:

- Infrequently Accessed Areas Inspection Program
- Structures Monitoring Program

3.5.2.1.22 Tank Foundations

The Fire Water Tanks 1 and 2 Foundations and the SBO Diesel Fuel Oil Storage Tank Foundation are shared structures and the aging management review results presented here and in Table 3.5.2-22, Tank Foundations - Aging Management Evaluation are duplicated in the Millstone Unit 3 license renewal application.

Materials

The materials of construction for the Tank Foundations structural members are:

- Carbon Steel
- Concrete

Environment

The Tank Foundations structural members are exposed to the following environments:

- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Tank Foundations structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Tank Foundations structural members:

- Structures Monitoring Program

3.5.2.1.23 Yard Structures

Materials

The materials of construction for the Yard Structures structural members are:

- Aluminum
- Carbon Steel
- Concrete

Environment

The Yard Structures structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Soil

Aging Effects Requiring Management

The following aging effects, associated with the Yard Structures structural members, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Yard Structures structural members:

- Structures Monitoring Program

3.5.2.1.24 NSSS Equipment Supports

Materials

The materials of construction for the NSSS equipment supports structural members are:

- Carbon Steel and Low-alloy Steel

- Cast Iron
- Copper alloys

Environment

The NSSS equipment supports structural members are exposed to the following environments:

- Air
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the NSSS equipment supports, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the NSSS equipment supports structural members:

- Boric Acid Corrosion
- General Condition Monitoring
- Inservice Inspection Program: Systems, Components and Supports

3.5.2.1.25 General Structural Supports

Materials

The materials of construction for the General Structural Supports structural members are:

- Aluminum
- Carbon Steel and Low-alloy Steel
- Copper alloys
- Galvanized Steel
- Rubber
- Stainless Steel
- Teflon

Environment

The General Structural Supports structural members are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage
- Sea Water
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the General Structural Supports, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the General Structural Supports structural members:

- Battery Rack Inspections
- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring
- Infrequently Accessed Areas Inspection Program
- Inservice Inspection Program: Systems, Components and Supports
- Structures Monitoring Program

3.5.2.1.26 Miscellaneous Structural Commodities

Materials

The materials of construction for the Miscellaneous Structural Commodities commodity groups are:

- Aluminum
- Carbon Steel
- Grout

- Gypsum
- Marinite
- Neoprene
- Pyrocrete
- Rubber
- Sealants
- Silicone rubber
- Stainless Steel
- Thermo-lag
- Wood

Environment

The Miscellaneous Structural Commodities commodity groups are exposed to the following environments:

- Air
- Atmosphere/Weather
- Borated Water Leakage

Aging Effects Requiring Management

The following aging effects, associated with the Miscellaneous Structural Commodities, require management:

- Change of Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Miscellaneous Structural Commodities commodity groups:

- Boric Acid Corrosion
- Fire Protection Program
- General Condition Monitoring
- Structures Monitoring Program
- Work Control Process

3.5.2.1.27 Load Handling Cranes and Devices

Materials

The materials of construction for the Load Handling Cranes and Devices commodity groups are:

- Carbon Steel and Low-alloy Steel
- Stainless Steel

Environment

The Load Handling Cranes and Devices commodity groups are exposed to the following environments:

- Air
- Borated Water Leakage
- Treated Water

Aging Effects Requiring Management

The following aging effects, associated with the Load Handling Cranes and Devices, require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Load Handling Cranes and Devices commodity groups:

- Boric Acid Corrosion
- Chemistry Control for Primary Systems Program
- General Condition Monitoring
- Inspection Activities: Load Handling Cranes and Devices

3.5.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Structures and Component Supports, those programs are addressed in the following sections.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

The Containment structure is constructed of high-density, low-permeability concrete, with proper arrangement and distribution of reinforcement to control aging effects, in accordance with the guidance of ACI 318-63 and ACI 201.2R-77. In addition, aging effects for Containment concrete are managed by the Inservice Inspection Program: Containment Inspections.

Recent groundwater analysis results (pH: 6.10-8.06, chloride content: 22 - 300 ppm, and sulfate content: 8 - 112 ppm) have shown that the groundwater at Millstone is not aggressive. The Structures Monitoring Program includes periodic groundwater monitoring in order to demonstrate that the below-grade environment remains non-aggressive.

Therefore, aging effects for inaccessible Containment concrete areas are not significant.

3.5.2.2.1.2 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

Aging effects due to settlement are not expected. Millstone structures are founded on bedrock, well-consolidated in-situ material, or compacted fill. Additionally, no structures utilize porous concrete subfoundations.

There is no installed dewatering system.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

No concrete structural components exceed specified temperature limits. General area temperatures remain below 150°F and local area temperatures remain below 200°F. Therefore, this item is not applicable.

3.5.2.2.1.4 Loss of Material due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate

The Containment structure is constructed of high-density, low-permeability concrete, with proper arrangement and distribution of reinforcement to control aging effects, in accordance with the guidance of ACI 318-63 and ACI 201.2R-77.

The Containment structure is monitored for penetrating cracks by the Inservice Inspection Program: Containment Inspections to prevent water seepage to the liner.

Aging effects for the Containment moisture barrier are managed by the Inservice Inspection Program: Containment Inspections.

Borated water spills and water ponding on the Containment concrete floor are not common, and are cleaned up promptly when identified. The design of the Containment floor provides for collection of water in a sump area that is maintained pumped down.

Therefore, aging effects for inaccessible areas of the Containment liner are not significant.

3.5.2.2.1.5 Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

Loss of tendon prestress is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.5, Concrete Containment Tendon Prestress.

3.5.2.2.1.6 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis.

There is no fatigue TLAA for bellows associated with Containment penetrations.

3.5.2.2.1.7 Cracking due to Cyclic Loading and SCC

Cracking of Containment penetration sleeves and dissimilar metal welds due to cyclic loading is considered metal fatigue and is addressed as a TLAA in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis. There is no fatigue TLAA for bellows associated with Containment penetrations.

As discussed in Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals, 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.

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, cracking due to SCC does not require aging management.

3.5.2.2.2 Class I Structures

3.5.2.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program

The Structures Monitoring Program is used to manage the aging effects associated with structures. However, aging effects for infrequently accessed portions of structures are managed by the Infrequently Accessed Areas Inspection Program.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

Recent groundwater analysis results (pH: 6.10-8.06, chloride content: 22 - 300 ppm, and sulfate content: 8 - 112 ppm) have shown that the groundwater at Millstone is not aggressive. The Structures Monitoring Program includes periodic groundwater monitoring in order to demonstrate that the below-grade environment remains non-aggressive.

3.5.2.2.3 Component Supports

3.5.2.2.3.1 Aging of Supports Not Covered by Structures Monitoring Program

The Structures Monitoring Program manages aging effects associated with large equipment supports. The General Condition Monitoring program manages aging effects for supports for other components and piping. The Battery Rack Inspections program manages age-related degradation specific to battery supports. The aging effects for supports in infrequently accessed areas are managed by the Infrequently Accessed Areas Inspection Program.

3.5.2.2.3.2 Cumulative Fatigue Damage due to Cyclic Loading

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3, Metal Fatigue.

3.5.2.3 TIME-LIMITED AGING ANALYSIS

The TLAAs identified below are associated with the Structures and Component Supports structural members. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Metal Fatigue (Section 4.3, Metal Fatigue)

- Containment Tendons (Section 4.5, Concrete Containment Tendon Prestress)
- Containment Liner and Penetrations (Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis)
- Load Handling Cranes (Section 4.7.1, Crane Load Cycle Limit)

3.5.3 CONCLUSION

The Structures and Component Supports structural members that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Structures and Component Supports structural members are identified in the summary tables and Section 3.5.2.1.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the programs provided in Appendix B, the effects of aging associated with the Structures and Component Supports structural members will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.5.4 REFERENCES

None

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
Common Components of All Types of PWR and BWR Containment					
3.5.1- 01	Penetration sleeves, penetration bellows, and dissimilar metal welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis.
3.5.1- 02	Penetration sleeves, bellows, and dissimilar metal welds.	Cracking due to cyclic loading; crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	Yes, detection of aging effects is to be evaluated	Not consistent with NUREG-1801. Cracking due to cyclic loading is addressed as a TLAA in Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis. Cracking due SCC is not an aging effect requiring management for these components. Further evaluation is documented in Subsection 3.5.2.2.1.7.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 03	Penetration sleeves, penetration bellows, and dissimilar metal welds	Loss of material due to corrosion	Containment ISI and Containment leak rate test	No	Consistent with NUREG-1801. Loss of material for Containment penetrations is managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP.
3.5.1- 04	Personnel airlock and equipment hatch	Loss of material due to corrosion	Containment ISI and Containment leak rate test	No	Consistent with NUREG-1801. Loss of material for the personnel air lock and equipment hatch components is managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 05	Personnel airlock and equipment hatch	Loss of leak tightness in closed position due to mechanical wear of locks, hinges, and closure mechanism	Containment leak rate test and Plant Technical Specifications	No	Consistent with NUREG-1801. Loss of material is managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP. Leak tightness testing for these components is governed by the plant Technical Specifications, which are part of the current licensing basis and will remain in effect during the period of extended operation.
3.5.1- 06	Seals, gaskets, and moisture barriers	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	No	Not consistent with NUREG-1801. Aging effects for the Containment moisture barrier is managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP. Aging effects for O-rings and gaskets are managed by the Work Control Process.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
PWR Concrete (Reinforced and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment					
3.5.1- 07	Concrete elements: foundation, dome, and wall.	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	Yes, if aging mechanism is significant for inaccessible areas	Consistent with NUREG-1801. Aging effects for accessible Containment concrete areas are managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP. Aging effects for inaccessible Containment concrete are not significant. Further evaluation is documented in Subsection 3.5.2.2.1.1.
3.5.1- 08	Concrete elements: foundation	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. Settlement is not expected to occur during the period of extended operation. Further evaluation is documented in Subsection 3.5.2.2.1.2.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 09	Concrete elements: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. There are no structures founded on porous concrete subfoundations. Further evaluation is documented in Subsection 3.5.2.2.1.2.
3.5.1- 10	Concrete elements: foundation, dome, and wall	Reduction of strength and modulus due to elevated temperature	Plant specific	Yes, for any portions of concrete containment that exceed specified temperature limits	NUREG-1801 item is not applicable. The specified temperature limits for concrete are not exceeded.
3.5.1- 11	Prestressed containment: tendons and anchorage components	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.5, Concrete Containment Tendon Prestress.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 12	Steel elements: liner plate and containment shell	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Yes, if corrosion is significant for inaccessible areas	Consistent with NUREG-1801. Aging effects for accessible areas of the Containment liner are managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP. Loss of material due to corrosion is not significant for inaccessible areas. Further evaluation is documented in Subsection 3.5.2.2.1.4.
3.5.1- 13	BWR Only				
3.5.1- 14	Steel elements: protected by coating	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	No	Not consistent with NUREG-1801. Loss of material for Containment liner elements is managed by the Inservice Inspection Program: Containment Inspections. Credit is not taken for protective coatings in the aging management review process.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 15	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	No	Consistent with NUREG-1801. Loss of material for Containment tendons and anchorage components is managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP.
3.5.1- 16	Concrete elements: foundation, dome, and wall	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	No	Consistent with NUREG-1801. Containment concrete element aging effects are managed by the Inservice Inspection Program: Containment Inspections. This program takes some exceptions to the NUREG-1801 AMP.
3.5.1- 17	BWR Only				
3.5.1- 18	BWR Only				
3.5.1- 19	BWR Only				

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
Class I Structures					
3.5.1- 20	All Groups except Group 6: accessible interior/exterior concrete & steel components	All types of aging effects	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. Aging effects are managed by the Structures Monitoring Program, except for infrequently accessed areas, which are managed by the Infrequently Accessed Areas Inspection Program. Further evaluation is documented in Subsection 3.5.2.2.2.1.
3.5.1- 21	Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant-specific	Yes, if an aggressive below-grade environment exists	Consistent with NUREG-1801. Groundwater monitoring is accomplished through the Structures Monitoring Program to confirm a non-aggressive below-grade environment for concrete. Further evaluation is documented in Subsection 3.5.2.2.2.2.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 22	Group 6: all accessible/ inaccessible concrete, steel, and earthen components	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspections and maintenance	No	Not consistent with NUREG-1801. Aging effects for water control structure components are managed by the Structures Monitoring Program. For infrequently accessed areas of water control structures, aging effects are managed by the Infrequently Accessed Areas Inspection Program.
3.5.1- 23	Group 5: liners	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Water chemistry and monitoring of spent fuel pool water level	No	Consistent with NUREG-1801. Aging effects for the spent fuel pool liner are managed by the Chemistry Control for Primary Systems Program. This program takes some exceptions to the NUREG-1801 AMP. Spent fuel pool water level is monitored in accordance with the plant Technical Specifications, which are part of the current licensing basis and will remain in effect during the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 24	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall	No	Consistent with NUREG-1801. Aging effects for masonry block walls are managed by the Structures Monitoring Program.
3.5.1- 25	Groups 1-3, 5, 7-9: foundation	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. Settlement is not expected to occur during the period of extended operation. Further evaluation is documented in Subsection 3.5.2.2.1.2.
3.5.1- 26	Groups 1-3, 5-9: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. There are no structures founded on porous concrete subfoundations. Further evaluation is documented in Subsection 3.5.2.2.1.2.
3.5.1- 27	Groups 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, for any portions of concrete that exceed specified temperature limits	NUREG-1801 item is not applicable. The specified temperature limits for concrete are not exceeded.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-28	Groups 7, 8: liners	Crack Initiation and growth due to SCC; Loss of material due to crevice corrosion	Plant-specific	Yes	Not consistent with NUREG-1801. There are no steel-lined concrete tanks. Other tanks are evaluated as part of the associated plant system.
Component Supports					
3.5.1- 29	All Groups: support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc.	Aging of component supports	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not consistent with NUREG-1801. Aging effects for component supports are managed by the Structures Monitoring Program, the General Condition Monitoring program, the Battery Rack Inspections, and the Infrequently Accessed Areas Inspection Program. Further evaluation is documented in Subsection 3.5.2.2.3.1
3.5.1- 30	Groups B1.1, B1.2, and B1.3: support members: anchor bolts and welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1- 31	All Groups: support members: anchor bolts and welds	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Not consistent with NUREG-1801. Loss of material due to boric acid corrosion is managed with the Boric Acid Corrosion and General Condition Monitoring programs.
3.5.1- 32	Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolators	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	No	Consistent with NUREG-1801. Aging effects for ASME Class 1, 2, and 3 piping and component supports is managed by the Inservice Inspection Program: Systems, Components and Supports. Loss of material for non-ASME piping and component supports is managed by the Structures Monitoring Program and the General Condition Monitoring program.
3.5.1-33	Group B1.1: high strength low-alloy bolts	Crack initiation and growth due to SCC	Bolting integrity	No	Not consistent with NUREG-1801. Cracking due to SCC is not an aging effect requiring management for NSSS equipment support bolting. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for additional information.

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment liner	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A1.2-a	3.5.1- 12	B
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Containment Shell (cylindrical wall and dome)	PB; SSR; EN; FB; MB; EQB	Concrete	Air	Change of Material Properties	Inservice Inspection Program: Containment Inspections			H
				Cracking	Inservice Inspection Program: Containment Inspections	II.A1.1-d	3.5.1- 16	B
			Soil	Change of Material Properties	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
				Cracking	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A
				Loss of Material	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Sump Screen	SSR	Stainless Steel	Air	None	None			H, 2
Door locking mechanism	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.2-a	3.5.1- 04	B
					Inservice Inspection Program: Containment Inspections	II.A3.2-b	3.5.1- 05	B
Electrical Penetrations	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.1-a	3.5.1- 03	B
Equipment hatch	PB; SSR; FB	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.2-a	3.5.1- 04	B
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A4.1-b	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion Bellows	PB	Stainless Steel	Air	None	None			I, 9, 11
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	C, 9
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	C, 9
Fuel transfer tube	PB; SSR	Stainless Steel	Air	None	None			I, 8, 11
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	C, 8
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	C, 8
Fuel transfer tube gate valve	PB; SSR	Stainless Steel	Air	None	None			G, 9
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	C, 9
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	C, 9

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Transfer Tube Penetration	PB; SSR	Stainless Steel	Air	None	None			I, 8, 11
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 05	A, 8,
					Chemistry Control for Primary Systems Program	V.C.1-b	3.2.1- 06	A, 8,
Gaskets	PB; SSR	Silicone rubber	Air	Change of Material Properties	Work Control Process	II.A3.3-a	3.5.1- 06	E, 5, 9
				Cracking	Work Control Process	II.A3.3-a	3.5.1- 06	E, 5, 9
Hinges and Pins	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.2-a	3.5.1- 04	B
					Inservice Inspection Program: Containment Inspections	II.A3.2-b	3.5.1- 05	B
Jet impingement barriers	JIS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A4.1-b	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Mechanical Penetrations	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.1-a	3.5.1- 03	B
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Miscellaneous Steel (Brackets, Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	SSR; SNS	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A1.2-a	3.5.1- 12	B, 7
					Structures Monitoring Program	III.A4.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Missile barriers	SSR; MB	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A4.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Moisture Barrier	SNS	Thiokol polysulfide	Air	Change of Material Properties	Inservice Inspection Program: Containment Inspections	II.A3.3-a	3.5.1- 06	B
				Cracking	Inservice Inspection Program: Containment Inspections	II.A3.3-a	3.5.1- 06	B
Neutron Shield Tank	SNS	Stainless Steel	Air	None	None			H, 3
			Treated Water	Loss of Material	Work Control Process			H, 10, 12
					Work Control Process			H, 10, 12
O-Rings	PB; SSR	Silicone rubber	Air	Change of Material Properties	Work Control Process	II.A3.3-a	3.5.1- 06	E, 6
				Cracking	Work Control Process	II.A3.3-a	3.5.1- 06	E, 6
Personnel lock	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.2-a	3.5.1- 04	B
Pipe	PB	Stainless Steel	Air	None	None			I, 3, 4, 11

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Shield Wall Plate	SSR	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A4.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Reactor cavity seal ring	PB; SSR	Stainless Steel	Air	None	None			H, 3, 9
Refueling cavity liner	PB; SSR	Stainless Steel	Air	None	None			H, 3, 9
Spare Penetrations	PB	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A3.1-a	3.5.1- 03	B
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Pedestals, Walls)	SSR; EN; MB; SNS; JIS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A4.1-b	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
				Cracking	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A
				Loss of Material	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A
Structural Steel (Beams, Bracing, Columns and baseplates, Trusses)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A4.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tendon Anchorages	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A1.3-a	3.5.1- 15	A
Tendon Gallery	SSR	Concrete	Air	Change of Material Properties	Inservice Inspection Program: Containment Inspections			H
				Cracking	Inservice Inspection Program: Containment Inspections	II.A1.1-d	3.5.1- 16	B
			Soil	Change of Material Properties	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
				Cracking	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A
				Loss of Material	Structures Monitoring Program	II.A1.1-c	3.5.1- 07	A
					Structures Monitoring Program	II.A1.1-e	3.5.1- 07	A
Tendon Wires	PB; SSR	Carbon Steel	Air	Loss of Material	Inservice Inspection Program: Containment Inspections	II.A1.3-a	3.5.1- 15	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-1: Structures and Component Supports - Unit 2 Containment - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valve bodies	PB	Stainless Steel	Air	None	None			I, 3, 4, 11

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-2: Structures and Component Supports - Unit 2 Containment Enclosure Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Blow-off metal siding/ Panel	EN; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Doors	EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
Metal siding	EN; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-2: Structures and Component Supports - Unit 2 Containment Enclosure Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Metal siding-caulking	EN; SNS	Sealants	Air	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Scuppers	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-2: Structures and Component Supports - Unit 2 Containment Enclosure Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Caisson, Floor slabs, Grade Beams, Slabs on grade, Walls)	SSR; EN; FB; SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-2: Structures and Component Supports - Unit 2 Containment Enclosure Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Caisson, Floor slabs, Grade Beams, Slabs on grade, Walls)	SSR; EN; FB; SNS; FLB	Concrete	Soil	Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	SSR; EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Vent stacks (supports)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control room ceiling panels	SSR; SNS	Aluminum	Air	None	None			F, 2
Control room ceiling supports	SSR; SNS	Carbon Steel	Air	None	None			I, 2, 14
Doors	EN; SNS; JIS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
Masonry block walls	SSR; FB; SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
Metal siding	EN; MB; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Metal Smoke Barrier	PB; EN; SNS	Carbon Steel	Air	None	None			I, 2, 13, 14
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
		Stainless Steel	Air	None	None			G
Neutron absorber elements	SSR; SNS	Boraflex	Treated Water	Change of Material Properties	Boraflex Monitoring	VII.A2.1-a	3.3.1- 12	A
Scuppers	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sliding Bearings	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
		Teflon	Air	Change of Material Properties	Structures Monitoring Program			F
Spent Fuel Pool Gate	PB; SSR	Stainless Steel	Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	III.A5.2-b	3.5.1- 23	B, 3, 15
Spent Fuel Pool Gate-Seal	PB; EN; SNS	Rubber	Treated Water	Change of Material Properties	Work Control Process			J
				Cracking	Work Control Process			J
Spent fuel pool liner plates	PB; SSR	Stainless Steel	Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	III.A5.2-b	3.5.1- 23	B, 3, 15
Spent fuel storage racks	SSR	Stainless Steel	Treated Water	Loss of Material	Chemistry Control for Primary Systems Program			H, 3

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Slabs on grade, Walls)	PB; SSR; EN; FB; MB; SNS; FLB; JIS; EQB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H, 13
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A, 13
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H, 13
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A, 13
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A, 13
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A, 13

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Slabs on grade, Walls)	PB; SSR; EN; FB; MB; SNS; FLB; JIS; EQB	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A, 13
				Cracking	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A, 13
					Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A, 13
				Loss of Material	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A, 13
					Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A, 13
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	SSR; EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sumps	SSR; SNS; FLB	Concrete	Raw Water	Change of Material Properties	Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-d	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-d	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-3: Structures and Component Supports - Unit 2 Auxiliary Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tunnel	SSR; SNS; JIS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cask Wash Pit Liner	SSR; EN; SNS	Stainless Steel	Air	None	None			G, 16
Doors	EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
Masonry block walls	SSR; FB; SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
Metal siding	EN; MB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Missile barriers	SSR; MB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
New fuel racks assembly	SSR	Stainless Steel	Air	None	None			G
Scuppers	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; EN; FB; MB; SNS; FLB; EQB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; EN; FB; MB; SNS; FLB	Concrete	Soil	Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-4: Structures and Component Supports - Unit 2 Warehouse Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tunnel	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Blow-off metal siding/ Panel	SSR; EN; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Doors	EN; SNS; JIS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
Hatches	SSR; SNS; JIS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Masonry block walls	SSR; FB; SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
Metal siding	EN; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Metal siding-caulking	EN; SNS	Sealants	Air	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
Miscellaneous Steel (Brackets, Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating, Stairs)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Scuppers	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Sliding Bearings	SSR; SNS	Teflon	Air	Change of Material Properties	Structures Monitoring Program			F

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Footing and grade beams, Grade Beams, Pedestals, Roof slabs, Slabs on grade, Spread footing, Turbine Pedestal, Walls)	SSR; EN; FB; MB; SNS; FLB; JIS; EQB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Footing and grade beams, Grade Beams, Pedestals, Roof slabs, Slabs on grade, Spread footing, Turbine Pedestal, Walls)	SSR; EN; FB; MB; SNS; FLB; JIS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Sump Liner	SSR; SNS; FLB	Carbon Steel	Raw Water	Loss of Material	Work Control Process			J

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-5: Structures and Component Supports - Unit 2 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sumps	SSR; SNS; FLB	Concrete	Raw Water	Change of Material Properties	Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-d	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-d	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-f	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-6: Structures and Component Supports - Unit 1 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
H-Piles	SNS	Carbon Steel	Soil	None	None			G, 17
Scuppers	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	C
Sliding Bearings	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	EN; SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-6: Structures and Component Supports - Unit 1 Turbine Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	EN; SSR; SNS; FLB	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing, Columns and baseplates, Concrete floor framing and decking, Roof framing and decking)	EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-7: Structures and Component Supports - Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Brackets, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A1.2-a	3.5.1- 20	A
Sliding Bearings	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A1.2-a	3.5.1- 20	A
		Teflon	Air	Change of Material Properties	Structures Monitoring Program			F
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	EN; FB; MB; SNS; FLB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A1.1-c	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-7: Structures and Component Supports - Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Roof slabs, Walls)	EN; FB; MB; SNS; FLB	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A1.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A1.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A1.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A1.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A1.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-7: Structures and Component Supports - Unit 1 Control Room and Radwaste Treatment Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Steel (Beams, Columns and baseplates)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A1.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-8: Structures and Component Supports - Unit 2 Fire Pump House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Equipment pads / grout	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Masonry block walls	SNS; FLB	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
			Atmosphere/ Weather	Cracking	Structures Monitoring Program			G

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-8: Structures and Component Supports - Unit 2 Fire Pump House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs)	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Roof framing and decking)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-9: Structures and Component Supports - Unit 3 Fire Pump House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Equipment pads / grout	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	FB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Masonry block walls	SNS; FLB	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
			Atmosphere/ Weather	Cracking	Structures Monitoring Program			G

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-9: Structures and Component Supports - Unit 3 Fire Pump House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs)	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Roof framing and decking)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-10: Structures and Component Supports - SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Checkered Plates)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Roofing	SNS	Aluminum	Air	None	None			F, 18
			Atmosphere/ Weather	None	None			F, 18
Siding	SNS	Aluminum	Air	None	None			F, 18
			Atmosphere/ Weather	None	None			F, 18

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-10: Structures and Component Supports - SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs)	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-10: Structures and Component Supports - SBO Diesel Generator Enclosure & Fuel Oil Tank Vault - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs)	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-11: Structures and Component Supports - Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Masonry block walls	SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
Miscellaneous Steel (Platforms and Grating)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Walls)	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-11: Structures and Component Supports - Unit 2 Condensate Polishing Facility and Warehouse No. 5 - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Walls)	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing, Columns and baseplates)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-12: Structures and Component Supports - Security Diesel Generator Enclosure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Checkered Plates)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Roofing	SNS	Aluminum	Air	None	None			F
			Atmosphere/ Weather	None	None			F
		Wood	Air	Cracking	Structures Monitoring Program			F
				Loss of Material	Structures Monitoring Program			F
Siding	SNS	Aluminum	Air	None	None			F
			Atmosphere/ Weather	None	None			F
		Wood	Air	Cracking	Structures Monitoring Program			F
				Loss of Material	Structures Monitoring Program			F
Structural Framing	SNS	Aluminum	Air	None	None			F

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-12: Structures and Component Supports - Security Diesel Generator Enclosure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing)	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-13: Structures and Component Supports - Stack Monitoring Equipment Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Equipment pads / grout	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Masonry block walls	SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
			Atmosphere/ Weather	Cracking	Structures Monitoring Program			G
Structural Reinforced Concrete (Roof slabs, Slabs on grade, Spread footing, Walls)	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-13: Structures and Component Supports - Stack Monitoring Equipment Building - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Roof slabs, Slabs on grade, Spread footing, Walls)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-14: Structures and Component Supports - Millstone Stack - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	SSR; MB	Concrete	Air	Change of Material Properties	Infrequently Accessed Areas Inspection Program			H
					Structures Monitoring Program			H
				Cracking	Infrequently Accessed Areas Inspection Program	III.A3.1-c	3.5.1- 20	E
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-14: Structures and Component Supports - Millstone Stack - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Foundation mat slabs, Walls)	SSR; MB	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel (Beams, Bracing)	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A, 19

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-15: Structures and Component Supports - Switchyard Control House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Equipment pads / grout	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B2.2-a	3.5.1- 29	A
Masonry block walls	SNS	Concrete	Air	Cracking	Structures Monitoring Program	III.A3.3-a	3.5.1- 24	A
			Atmosphere/ Weather	Cracking	Structures Monitoring Program			G
Structural Reinforced Concrete	SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-15: Structures and Component Supports - Switchyard Control House - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-16: Structures and Component Supports - Retaining Wall - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing, Walls)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-17: Structures and Component Supports - 345kV Switchyard - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Structural Steel	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Doors	EN; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
Equipment pads / grout	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program	III.B4.3-a	3.5.1- 29	A
				Cracking	Structures Monitoring Program	III.B4.3-a	3.5.1- 29	A
Hatches	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Hatches	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Checkered Plates, Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.), Ladders, Platforms and Grating)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
			Sea Water	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.2-a	3.5.1- 22	E, 20
		Stainless Steel	Air	Loss of Material	Structures Monitoring Program			G
Missile barriers	SSR; MB; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; SCW; MB; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; SCW; MB; SNS	Concrete	Sea Water	Change of Material Properties	Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-b	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-b	3.5.1- 22	E, 20
					Structures Monitoring Program			H, 20
					Infrequently Accessed Areas Inspection Program			H, 20

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; SCW; MB; SNS	Concrete	Sea Water	Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-a	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-c	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-d	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E, 20

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; SCW; MB; SNS	Concrete	Sea Water	Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-a	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-d	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E, 20
					Structures Monitoring Program	III.A6.1-h	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.1-h	3.5.1- 22	E, 20

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-18: Structures and Component Supports - Unit 2 Intake Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Beams, Columns, Floor slabs, Foundation mat slabs, Roof slabs, Walls)	SSR; SCW; MB; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Cracking	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
Structural Steel (Beams, Bracing, Roof framing and decking)	SSR; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A
Trash racks	SSR; SCW	Carbon Steel	Sea Water	Loss of Material	Structures Monitoring Program	III.A6.2-a	3.5.1- 22	A, 20
					Infrequently Accessed Areas Inspection Program	III.A6.2-a	3.5.1- 22	E, 20

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-19: Structures and Component Supports - Sea Walls - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing, Walls)	SSR; FLB	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
			Sea Water	Change of Material Properties	Structures Monitoring Program	III.A6.1-b	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
					Structures Monitoring Program			H

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-19: Structures and Component Supports - Sea Walls - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing, Walls)	SSR; FLB	Concrete	Sea Water	Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-h	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-19: Structures and Component Supports - Sea Walls - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing, Walls)	SSR; FLB	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Cracking	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-20: Structures and Component Supports - Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Roof slabs, Walls)	PB; SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H, 21, 22
				Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 21, 22, 23
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A, 21, 22
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 21, 22, 23
			Sea Water	Change of Material Properties	Structures Monitoring Program	III.A6.1-b	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 21
					Structures Monitoring Program			H, 21

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-20: Structures and Component Supports - Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Roof slabs, Walls)	PB; SNS	Concrete	Sea Water	Cracking	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 21, 23
					Structures Monitoring Program	III.A6.1-c	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 21
				Loss of Material	Structures Monitoring Program	III.A6.1-a	3.5.1- 22	A, 21, 23
					Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-h	3.5.1- 22	A, 21

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-20: Structures and Component Supports - Unit 2 Discharge Tunnel and Discharge Structure - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Floor slabs, Roof slabs, Walls)	PB; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A,21
				Cracking	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 21
				Loss of Material	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A, 21
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A, 21

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-21: Structures and Component Supports - Unit 2 Bypass Line - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	SNS	Concrete	Sea Water	Change of Material Properties	Infrequently Accessed Areas Inspection Program	III.A6.1-b	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program			H
				Cracking	Infrequently Accessed Areas Inspection Program	III.A6.1-c	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program	III.A6.1-d	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E
				Loss of Material	Infrequently Accessed Areas Inspection Program	III.A6.1-d	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program	III.A6.1-e	3.5.1- 22	E
					Infrequently Accessed Areas Inspection Program	III.A6.1-h	3.5.1- 22	E

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-21: Structures and Component Supports - Unit 2 Bypass Line - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Cracking	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A
				Loss of Material	Structures Monitoring Program	III.A6.1-d	3.5.1- 22	A
					Structures Monitoring Program	III.A6.1-e	3.5.1- 22	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 Condensate Storage Tank Foundation and Missile Barrier								
Miscellaneous Steel (Brackets, Ladders, Platforms and Grating)	SSR; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A8.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Foundation mat slabs, Walls)	SSR; MB	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Walls)	SSR; MB	Concrete	Soil	Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
Fire Water Tanks 1 and 2 Foundations								
Structural Reinforced Concrete (Footing)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
Structural Reinforced Concrete (Footing)	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing)	SNS	Concrete	Soil	Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
Unit 2 Diesel Fuel Oil Storage Tank Foundation								
Structural Reinforced Concrete	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete	SNS	Concrete	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 Refueling Water Storage Tank Foundation								
Structural Reinforced Concrete (Foundation mat slabs)	SSR	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-22: Structures and Component Supports - Tank Foundations - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
SBO Diesel Fuel Oil Storage Tank Foundation								
Structural Reinforced Concrete (Foundation mat slabs)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 Transformer Firewalls and Dikes								
Structural Reinforced Concrete (Footing, Walls)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
A700 Switchgear Enclosure Dike								
Doors	SNS; FLB	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete	SNS; FLB	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
			Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 Diesel Fuel Oil Storage Tank Dike								
Flood/Spill barriers including curbs, dikes, toe plates, and stop logs	FB; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A8.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Footing)	FB; SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A8.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A8.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing)	FB; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A8.1-d	3.5.1- 21	A
					Structures Monitoring Program	III.A8.1-e	3.5.1- 21	A
Structural Steel (Beams)	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A8.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 RWST Valve Pit								
Manhole Covers	SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	SSR; MB	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	SSR; MB	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Unit 2 Pipe Trenches								
Hatches	SSR; MB; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Hatches	SSR; MB; SNS	Concrete	Atmosphere/ Weather	Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Foundation mat slabs, Walls)	SSR; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Walls)	SSR; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Unit 2 Manholes								
Manhole Covers	SSR; MB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	SSR; MB; SNS	Concrete	Air	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Foundation mat slabs, Roof slabs, Walls)	SSR; MB; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
Unit 2 Duct Banks								
Duct banks	SSR; SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	C
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	C
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Duct banks	SSR; SNS	Concrete	Soil	Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	C
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	C

Unit 2 Security Lighting Supports (including poles)								
Lighting Poles	SNS	Aluminum	Atmosphere/ Weather	None	None			F
Miscellaneous Steel (Embedded Steel-Exposed Surfaces (shapes, plates, unistrut, etc.))	SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
Structural Reinforced Concrete (Footing)	SNS	Concrete	Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			H
				Cracking	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A
					Structures Monitoring Program	III.A3.1-c	3.5.1- 20	A
				Loss of Material	Structures Monitoring Program	III.A3.1-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-23: Structures and Component Supports - Yard Structures - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Reinforced Concrete (Footing)	SNS	Concrete	Soil	Change of Material Properties	Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Cracking	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A
				Loss of Material	Structures Monitoring Program	III.A3.1-e	3.5.1- 21	A
					Structures Monitoring Program	III.A3.1-g	3.5.1- 21	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Support: Bolting	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
Reactor Coolant Pump Support: Plate and Structural Shapes	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
Reactor Coolant Pump Support: Spring Hanger Assemblies	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Support: Bolting	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
Reactor Vessel Support: Plate and Structural Shapes	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel Support: Sliding Support Assembly	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 24
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
		Cast Iron	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 24
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator Support: Sliding Support Assembly	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 24
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
		Copper alloys	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 24
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1
Steam Generator Support: Bolting	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-24: Structures and Component Supports - NSSS Equipment Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator Support: Plate and Structural Shapes	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
Steam Generator Support: Sliding Base	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
Steam Generator Support: Snubber Attachment Hardware	SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Battery Racks	SNS; SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Battery Rack Inspections	III.B3.1-a	3.5.1- 29	E, 29
Electrical Conduit, Cable Trays	SNS; SSR	Aluminum	Air	None	None			F
			Atmosphere/ Weather	None	None			F
		Galvanized Steel	Air	None	None			I, 2, 30
			Atmosphere/ Weather	Loss of Material	General Condition Monitoring	III.B2.1-a	3.5.1- 29	C
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2.1-b	3.5.1- 31	C, 1
					General Condition Monitoring	III.B2.1-b	3.5.1- 31	C, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sliding Support Bearing and Sliding Surfaces	SNS; SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 26
					Structures Monitoring Program	III.B2.1-a	3.5.1- 29	A, 26
					General Condition Monitoring	III.B2.1-a	3.5.1- 29	C, 26
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
		Copper alloys	Air	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.1.3-a	3.5.1- 32	A, 26
					Structures Monitoring Program	III.B1.2.2-a	3.5.1- 32	E, 26
					General Condition Monitoring	III.B1.2.2-a	3.5.1- 32	E, 26
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion			G, 1
					General Condition Monitoring			G, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sliding Support Bearing and Sliding Surfaces	SNS; SSR	Stainless Steel	Air	None	None			H, 26
		Teflon	Air	None	None			H, 26

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Support Components (plate, structural shapes, etc.)	SNS; SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Infrequently Accessed Areas Inspection Program	III.B2.1-a	3.5.1- 29	E
					Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
					Structures Monitoring Program	III.B2.1-a	3.5.1- 29	A
					General Condition Monitoring	III.B2.1-a	3.5.1- 29	C
			Atmosphere/ Weather	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.2.1-a	3.5.1- 32	A
					Structures Monitoring Program	III.B2.1-a	3.5.1- 29	A
					General Condition Monitoring	III.B2.1-a	3.5.1- 29	C
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Structural Support Components (plate, structural shapes, etc.)	SNS; SSR	Stainless Steel	Air	None	None			H
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	III.A5.2-b	3.5.1- 23	B, 25
Vendor-supplied Specialty Items (spring hangers, struts, clamps, vibration isolators, etc.)	SNS; SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Infrequently Accessed Areas Inspection Program	III.B2.1-a	3.5.1- 29	E
					Inservice Inspection Program: Systems, Components and Supports	III.B1.1.1-a	3.5.1- 32	A
					Structures Monitoring Program	III.B2.1-a	3.5.1- 29	A
					General Condition Monitoring	III.B2.1-a	3.5.1- 29	C
			Atmosphere/ Weather	Loss of Material	Inservice Inspection Program: Systems, Components and Supports	III.B1.2.1-a	3.5.1- 32	A
					Structures Monitoring Program	III.B2.1-a	3.5.1- 29	A
					General Condition Monitoring	III.B2.1-a	3.5.1- 29	C

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Vendor-supplied Specialty Items (spring hangers, struts, clamps, vibration isolators, etc.)	SNS; SSR	Carbon Steel and Low-alloy Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1.1-b	3.5.1- 31	A, 1
					General Condition Monitoring	III.B1.1.1-b	3.5.1- 31	A, 1
		Rubber	Air	Change of Material Properties	Structures Monitoring Program	III.B4.2-a	3.5.1- 29	A
					General Condition Monitoring	III.B4.2-a	3.5.1- 29	C
					Structures Monitoring Program	III.B4.2-a	3.5.1- 29	A, 28
					General Condition Monitoring	III.B4.2-a	3.5.1- 29	C, 28
				Cracking	Structures Monitoring Program	III.B4.2-a	3.5.1- 29	A
					General Condition Monitoring	III.B4.2-a	3.5.1- 29	C
					Structures Monitoring Program	III.B4.2-a	3.5.1- 29	A, 28
					General Condition Monitoring	III.B4.2-a	3.5.1- 29	C, 28

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-25: Structures and Component Supports - General Structural Supports - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Vendor-supplied Specialty Items (spring hangers, struts, clamps, vibration isolators, etc.)	SNS; SSR	Stainless Steel	Air	None	None			H
			Sea Water	Loss of Material	Structures Monitoring Program			G, 27

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bus duct enclosures	EN	Aluminum	Air	None	None			F
Cable tray cover and assembly	FB; SNS	Carbon Steel	Air	None	None			I, 31
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Electrical Component Supports within cabinets and panels	SNS; SSR	Carbon Steel	Air	None	None			I, 31, 32
Enclosure	EN; EQB; FB	Carbon Steel	Air	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Expansion joint/Seismic gap material (between adjacent buildings/ structures)	SNS	Silicone rubber	Air	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
Expansion joint/Seismic gap material (fire-rated walls)	FB; SNS	Sealants	Air	Change of Material Properties	Fire Protection Program	VII.G.3-a	3.3.1- 20	D
				Cracking	Fire Protection Program	VII.G.3-a	3.3.1- 20	D
Fire boots	FB; SNS	Silicone rubber	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F
		Stainless Steel	Air	None	None			G

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire doors and/or EQ barrier doors	EQB; FB; PB; SNS; SSR	Carbon Steel	Air	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
					Structures Monitoring Program	VII.I.1-b	3.3.1- 05	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Fire resistant coating	FB; SNS	Pyrocrete	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F
Fire stops	FB; SNS	Sealants	Air	Change of Material Properties	Fire Protection Program	VII.G.3-a	3.3.1- 20	D
				Cracking	Fire Protection Program	VII.G.3-a	3.3.1- 20	D
		Thermo-lag	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F
Fire-rated Cable wraps	FB; SNS	Thermo-lag	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire/EQ barrier penetration seals (including ceramic daming material)	EQB; FB; FLB; PB; SNS; SSR	Ceramics	Air	None	None			F
		Grout	Air	Change of Material Properties	Fire Protection Program			H
					Work Control Process			H, 13
				Cracking	Fire Protection Program			F
					Work Control Process			F, 13
		Sealants	Air	Change of Material Properties	Fire Protection Program	VII.G.3-a	3.3.1- 20	B
					Work Control Process	VII.G.3-a	3.3.1- 20	E, 13
				Cracking	Fire Protection Program	VII.G.3-a	3.3.1- 20	B
					Work Control Process	VII.G.3-a	3.3.1- 20	E, 13
Flood door/gate gasket	FLB; SNS	Neoprene	Air	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
			Atmosphere/ Weather	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flood doors/gates	FLB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Flood prevention plugs	FLB; SNS	Carbon Steel	Air	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
		Rubber	Air	Change of Material Properties	Structures Monitoring Program	III.B4.2-a	3.5.1- 29	C
				Cracking	Structures Monitoring Program			H
Gaskets in Junction, terminal, and pull boxes	EN	Neoprene	Atmosphere/ Weather	Change of Material Properties	Work Control Process			F
				Cracking	Work Control Process			F
Gypsum boards	FB; SNS	Gypsum	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Junction, terminal, and pull boxes	EN	Carbon Steel	Air	None	None			I, 31
			Atmosphere/ Weather	Loss of Material	General Condition Monitoring	VII.I.1-b	3.3.1- 05	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Panels and Cabinets	EN; SNS; SSR	Carbon Steel	Air	None	None			I, 31
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Radiant energy shields	FB; SNS	Marinite	Air	Change of Material Properties	Fire Protection Program			F
				Cracking	Fire Protection Program			F
Stop Log	FLB; SNS	Wood	Air	Loss of Material	Structures Monitoring Program			H
Stop Log brackets	FLB; SNS	Carbon Steel	Atmosphere/ Weather	Loss of Material	Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-26: Structures and Component Supports - Miscellaneous Structural Commodities - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Stop Log gasket	FLB; SNS	Neoprene	Air	Change of Material Properties	Structures Monitoring Program			F
				Cracking	Structures Monitoring Program			F
Switchgear enclosures	EN	Carbon Steel	Air	None	None			I, 31
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1
Watertight door gasket	EN; FLB; SNS	Neoprene	Air	Change of Material Properties	Fire Protection Program			F
					Structures Monitoring Program			F
				Cracking	Fire Protection Program			F
					Structures Monitoring Program			F
Watertight doors	EN; FB; FLB; SNS	Carbon Steel	Air	Loss of Material	Fire Protection Program	VII.I.1-b	3.3.1- 05	A
					Structures Monitoring Program	III.A3.2-a	3.5.1- 20	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Table 3.5.2-27: Structures and Component Supports - Load Handling Cranes and Devices - Aging Management Evaluation

Structural Member	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cranes and monorails including bridge & trolley support members (girders, beams, angles, frames, plates, rails & anchorage)	SNS; SSR	Carbon Steel and Low-alloy Steel	Air	Loss of Material	Inspection Activities: Load Handling Cranes and Devices	VII.B.1-b	3.3.1- 16	A
					Inspection Activities: Load Handling Cranes and Devices	VII.B.2-a	3.3.1- 16	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	VII.I.1-a	3.3.1- 14	A, 1, 33
					General Condition Monitoring	VII.I.1-a	3.3.1- 14	A, 1, 33
Fuel elevator support members (structural plates, tracks & anchorage)	SNS	Stainless Steel	Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	III.A5.2-b	3.5.1- 23	D, 3
Fuel transfer machine and tilting mechanism support members (structural frame, tracks,& anchorage)	SNS	Stainless Steel	Air	None	None			G, 34
			Treated Water	Loss of Material	Chemistry Control for Primary Systems Program	III.A5.2-b	3.5.1- 23	D, 3, 35

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

Notes for Tables 3.5.2-1 through 3.5.2-28

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The Boric Acid Corrosion AMP includes specific inspections of reactor coolant pressure boundary and supporting systems components. The General Condition Monitoring AMP provides inspections for management of loss of material due to boric acid corrosion beyond the scope of the Boric Acid Corrosion AMP.

2. The structural members are not subject to an intermittent wetting environment.

3. Cracking due to SCC is only applicable to stainless steel components exposed to temperatures greater than 140°F. Refer to Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals for further information.

4. This component is related to the personnel lock equalizing system.

5. These gaskets are used for the reactor cavity seal.

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

6. O-rings are used for the equipment hatch and personnel lock.
7. Inservice Inspection Program: Containment Inspections are performed for embedded steel components attached to the exterior Containment shell wall to support the equipment hatch missile barrier door and Containment Enclosure Building.
8. The pressure boundary function of the portion of the fuel transfer tube inside Containment and the penetration sleeve is related to Containment integrity. The pressure boundary function of the fuel transfer tube outside Containment is spent fuel pool integrity when the spent fuel pool keyway gates are removed during fuel handling.
9. Not a Containment pressure boundary but a system pressure boundary.
10. The water used in this tank is not chemistry controlled water, therefore the Work Control Process is used to manage the aging effects.
11. NUREG-1801 item II.A3.1-d is not applicable. As discussed in Appendix C, Section C3.3.15, Stress-Corrosion Cracking – Metals, 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. 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, cracking due to SCC does not require aging management. Additionally, there are no dissimilar metal welds associated with the expansion bellows for the fuel transfer tube penetration.
12. Based on the operating experience, the neutron shield tank bags, that are inside the neutron shield tank may leak, thus treated water is used as an operating environment.
13. The pressure boundary function is applicable to the structural components that comprise the control room envelope pressure boundary.
14. NUREG-1801 item III.A1.2-a is not applicable since the environment for this item is dry, conditioned air that does not result in corrosion of carbon steel material.
15. Technical Specification 3/4.9.12 Storage Pool Water Level includes a surveillance requirement to verify minimum spent fuel pool water level.
16. The cask pit liner is normally dry and is subject to wetting only during cask washing operations.
17. H-Piles are in undisturbed and well consolidated soil, which does not contain sufficient oxygen to cause corrosion.
18. The roofing and siding includes aluminum panels and associated aluminum framing.
19. Applies to the steel supports for the metal floor deck and equipment supports inside the Millstone stack.

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

20. Infrequently Accessed Areas Inspection Program is applicable to the structural members/components in the Intake Structure water bays between the waterline and the bottom of the Intake Structure operating deck. The Structures Monitoring Program is applicable to the structural members/components in the Intake Structure water bay below the waterline.

21. The pressure boundary intended function is applicable to the Discharge Tunnel only.

22. Above the waterline, the walls of the Discharge Structure are treated as in an atmosphere/weather environment.

23. NUREG-1801 Item III.A6.1-a related to freeze-thaw is only applicable to the Discharge Structure structural members that are subject to atmosphere/weather, due to tidal action, and the portion that is a few inches below the water surface.

24. The sliding surfaces of this support element are permanently lubricated with a graphite-based lubricant (Lubrite process).

25. This environment is applicable to supports located in the spent fuel pool and refueling cavity.

26. A graphite pad is permanently bonded to carbon steel sliding plates in Unislide sliding supports. A Teflon-based pad is used as the sliding surface, in conjunction with stainless steel or carbon steel sliding plates, in Fluorogold sliding supports. A graphite-based lubricant is impregnated onto the sliding plate in Lubrite sliding supports.

27. The stainless steel supports associated with the sodium hypochlorite system are located underwater at the Intake Structure.

28. Only non-metallic vibration isolator support elements located inside Containment are subject to change of material properties due to irradiation.

29. Styrofoam spacers installed between battery cells are not subject to age-related degradation in a sheltered air environment and do not require aging management. The Battery Rack Inspections AMP includes a visual inspection of the battery rack components for signs of deterioration and would identify any visible damage to the spacers and initiate appropriate corrective action.

30. NUREG-1801 Item III.B2.1-a is not applicable since galvanized steel supports are not subject to corrosion in a dry, indoor air environment.

31. NUREG-1801 Item VII.I.1-b does not apply since these component groups are not subjected to intermittent wetting.

32. Electrical component supports within cabinets and panels are not exposed to a borated water leakage environment.

33. The borated water leakage environment is applicable only to the refueling machine, the spent fuel platform crane, and the RBCCW monorail.

34. The air environment applies to portions of the transfer system in the transfer tube and to the Containment refueling cavity side of the fuel transfer canal.

35. The treated water environment applies to portions of the transfer system on the spent fuel pool side of the transfer canal.

See Table 2.0-1 for definitions of intended function. See Table 3.0-1 and Table 3.0-2 for definitions of environments.

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 INTRODUCTION

This section provides the results of the aging management review for those electrical components identified in Section 2.5, Electrical and Instrumentation and Controls. The electrical components, which are addressed in this section, are described in the indicated sections.

- Cable and Connectors (Section 2.5.1)
- Electrical Penetrations (Section 2.5.2)
- Bus Duct (Section 2.5.3)

Table 3.6.1, Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components, provides the summary of the programs evaluated in NUREG-1801 for the Electrical Components component groups that are relied on for license renewal.

This table uses the format described in Section 3.0 above. Note that this table only includes those component groups that are applicable to a PWR.

3.6.2 RESULTS

The following tables summarize the results of the aging management review for the components in the Electrical Components group:

Table 3.6.2-1, Cables and Connectors - Aging Management Evaluation

Table 3.6.2-2, Electrical Penetrations - Aging Management Evaluation

Table 3.6.2-3, Bus Duct - Aging Management Evaluation

The materials that components are fabricated from, the environments to which components are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above Electrical Components group in the following subsections of Section 3.6.2.1, Materials, Environment, Aging Effects Requiring Management and Aging Management Programs:

Section 3.6.2.1.1, Cables and Connectors

Section 3.6.2.1.2, Electrical Penetrations

Section 3.6.2.1.3, Bus Duct

3.6.2.1 MATERIALS, ENVIRONMENT, AGING EFFECTS REQUIRING MANAGEMENT AND AGING MANAGEMENT PROGRAMS

3.6.2.1.1 Cables and Connectors

Materials

The materials of construction for the cables and connectors commodity groups are:

- Inorganic Materials
- Metal
- Organic Compounds
- Teflon

Environment

The cables and connectors commodity groups are exposed to the following environments:

- Air
- Atmosphere/Weather
- Damp Soil
- Raw Water

Aging Effects Requiring Management

The following aging effects, associated with the cables and connectors, require management:

- Cracking
- Embrittlement
- Formation of Water Trees

Aging Management Programs

The following aging management programs manage the aging effects for the cables and connectors commodity groups:

- Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements
- Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits
- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

3.6.2.1.2 Electrical Penetrations

Materials

The materials of construction for the electrical penetrations component types are:

- CSPE
- Epoxy resins
- Metal conductors
- Phenolic
- Polymide (Kapton)
- Polysulfone
- Porcelain
- Stainless Steel
- Viton
- XLPE/XLPO

Environment

The electrical penetrations component types are exposed to the following environments:

- Air
- Gas

Aging Effects Requiring Management

Based on a review of the environment of the electrical penetration installation and the materials of construction, there are no aging effects requiring management during the period of extended operation for the electrical penetrations within the scope of license renewal.

Aging Management Programs

There are no aging management programs required for the electrical penetrations.

3.6.2.1.3 Bus Duct

Materials

The materials of construction for the bus duct component types subject to aging management review are:

- Metal conductors
- Porcelain

Environment

The bus duct component types are exposed to the following environments:

- Atmosphere/Weather

Aging Effects Requiring Management

Based on a review of the environment of the bus ducts installation and the materials of construction, there are no aging effects requiring management during the period of extended operation for the bus ducts within the scope of license renewal.

Aging Management Programs

There are no aging management programs required for bus ducts.

3.6.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the electrical components, those programs are addressed in the following sections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

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 Section 4.4, Environmental Qualification of Electric Equipment and Appendix B, Section B3.1, Electrical Equipment Qualification.

3.6.3 CONCLUSION

The Electrical Components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Electrical Components components are identified in the summary tables and Section 3.6.2.1.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the Electrical Components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.6.4 REFERENCES

None

Results Tables: Electrical and Instrumentation and Control Components

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1- 01	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	Environmental qualification of electric components	Yes, TLAA	This TLAA is evaluated in Section 4.4, Environmental Qualification of Electric Equipment and Appendix B, Section B3.1, Electrical Equipment Qualification.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1- 02	Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure caused by thermal/ thermoxidative degradation of organics; radiolysis and photolysis (ultraviolet [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	No	Consistent with NUREG-1801. Management of aging effects will be provided by the Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1- 03	Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance	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 program for electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801. Management of aging effects will be provided by the Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1- 04	Inaccessible medium-voltage (2 kV to 15 kV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	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	No	Consistent with NUREG-1801. Management of aging effects for inaccessible medium-voltage (2 kV to 15 kV) cables will be provided by the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program.
3.6.1- 05	Electrical connectors not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage	Corrosion of connector contact surfaces caused by intrusion of borated water	Boric acid corrosion	No	NUREG-1801 item is not applicable. Electrical enclosures are sealed where cables and conduit penetrate the enclosure. Electrical penetration pigtail conductors are insulated and terminated in junction boxes or sealed with splice insulation material. Additionally, review of operating experience has not indicated any occurrences of boric acid corrosion of bare metal or penetration electrical conductors. Therefore, corrosion of connector contact surfaces caused by intrusion of borated water is not an aging effect requiring management.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.6.2-1: Electrical Components - Cables and Connectors - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Conductors (includes shielding conductors)	CE	Metal	Air	None	None			G, 2
			Atmosphere/ Weather	None	None			G, 3
Insulation	IN	Inorganic Materials	Air	None	None			F
		Teflon	Air	None	None			F
Insulation (Except Sensitive Instrumentation Cables and Medium Voltage Inaccessible Cables Exposed to Moisture)	IN	Organic Compounds	Air	Cracking	Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A.1-a	3.6.1- 02	A
				Embrittlement	Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A.1-a	3.6.1- 02	A
			Atmosphere/ Weather	None	None			G, 4
			Damp Soil	None	None			G, 4
			Raw Water	None	None			G, 4

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.6.2-1: Electrical Components - Cables and Connectors - Aging Management Evaluation

Commodity Group	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Insulation (Medium Voltage Inaccessible Cables Exposed to Moisture)	IN	Organic Compounds	Raw Water	Formation of Water Trees	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	VI.A.1-c	3.6.1- 04	A
Insulation (Used in Sensitive Instrumentation Circuits)	IN	Organic Compounds	Air	Cracking	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	VI.A.1-b	3.6.1- 03	A
				Embrittlement	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	VI.A.1-b	3.6.1- 03	A

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.6.2-2: Electrical Components - Electrical Penetrations - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Conductor	CE	Metal	Air	None	None			G
			Gas	None	None			G
Feed-through module, Header plates, Bolting hardware, Compression connectors	PB; SS	Stainless Steel	(E) Air	None	None			I, 1
			(I) Gas	None	None			G
Feed-through sealant	IN; PB	Polysulfone	Gas	None	None			F
Insulation	IN	CSPE	Air	None	None			G
		Polymide (Kapton)	Air	None	None			G
		Porcelain	Air	None	None			F
		XLPE/XLPO	Air	None	None			G
Internal conductor support	SS	Phenolic	Gas	None	None			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.6.2-2: Electrical Components - Electrical Penetrations - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Penetration seals	PB	Epoxy resins	(E) Gas	None	None			G
			(I) Air	None	None			F
		Viton	(E) Gas	None	None			G
			(I) Air	None	None			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Table 3.6.2-3: Electrical Components - Bus Duct - Aging Management Evaluation

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bus Duct	CE	Metal	Atmosphere/ Weather	None	None			G
Bus Support Insulator	IN, SS	Porcelain	Atmosphere/ Weather	None	None			F

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

Notes for Tables 3.6.2-1 through 3.6.2-3

Industry Standard Notes

A. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes

1. The electrical penetration assemblies are not subjected to an intermittent wetting environment. Therefore, NUREG-1801 Item II.A3.1-d is not applicable.

2. Electrical cabinets and enclosures may contain bare metal conductors and connectors that are exposed to air.

3. Those conductors used in Switchyard applications are bare overhead conductors exposed to atmosphere/weather.

4. Cracking and Embrittlement are not aging effects requiring management in Atmosphere/Weather, Damp Soil or Raw Water environments because the maximum temperatures and cumulative radiation exposures for these environments are less than minimum thresholds required for aging. Refer to Appendix C, Section C3.3.16, Thermal Exposure – Non-metallic Materials and Appendix C, Section C3.3.11, Irradiation – Non-metallic Materials for further information.

See Table 2.0-1 for definitions of intended function, Table 3.0-1 for definitions of internal environments (I) and Table 3.0-2 for definitions of external environments (E).

4.0 TIME-LIMITED AGING ANALYSES

Two areas of plant technical assessment are required to support an application for a renewed operating license. The first area of technical review is the Integrated Plant Assessment, which is described in Chapters 2 and 3 of the License Renewal Application. The second area of technical review that is required for license renewal is the identification and evaluation of plant-specific time-limited aging analysis and exemptions. The identification and evaluation included in this chapter meet the requirements contained within 10 CFR 54.1(c) and allow the NRC to make the findings contained within 10 CFR 54.29(a)(2).

A listing of the abbreviations used within this section is contained in Section 1.4.

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

Description

10 CFR 54.21(c) requires that an evaluation of time-limited aging analyses be provided as part of the application for a renewed license. Time-limited aging analysis are defined in 10 CFR 54.3 as those licensee calculations and analysis that meet the following 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, for example, 40 years.
4. Were determined by the licensee to be relevant 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 function as delineated in 10 CFR 54.4(b).
6. Are contained or incorporated by reference in the current licensing basis.

4.1.1 IDENTIFICATION PROCESS OF TIME-LIMITED AGING ANALYSES

The process used to identify time-limited aging analysis is consistent with the guidance provided in NEI 95-10 (Reference 4.8-1). Calculations and analyses that meet the six criteria of 10 CFR 54.3 were identified by searching the current licensing basis, which includes the FSAR, engineering calculations, technical report, engineering work requests, licensing correspondence, and applicable vendor reports.

Once a TLAA was identified, an evaluation was performed to demonstrate that at least one of the following criteria is applicable:

(i) The analysis remains valid for the period of extended operation.

(ii) The analysis has been projected to the end of the period of extended operation.

(iii) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

The results of these evaluations are provided in Table 4.1-1 and discussed in Sections 4.2 through 4.7. Table 4.1-2 compares the Millstone Unit 2 time-limited aging analyses to those time-limited aging analyses identified in NUREG-1800 (Reference 4.8-9).

4.1.2 IDENTIFICATION OF EXEMPTIONS

Description

The requirements of 10 CFR 54.21(c) also stipulate that the application for a renewed operating license should include a list of unit-specific exemptions granted pursuant to 10 CFR 50.12, that are in effect, based on time-limited aging analysis, as defined in 10 CFR 54.3. Each active exemption has been reviewed to determine whether the exemption is based on a time-limited aging analyses.

Conclusion

No exemption granted pursuant to 10 CFR 50.12 and based on a time-limited aging analysis, as defined in 10 CFR 54.3, has been identified.

Table 4.1-1 Time-Limited Aging Analysis Categories

TLAA CATEGORY	ANALYSIS	SECTION	RESOLUTION
REACTOR VESSEL NEUTRON EMBRITTLEMENT	Upper Shelf Energy	4.2.2	(ii)
	Pressurized Thermal Shock	4.2.3	(ii)
	Pressure-Temperature Limits	4.2.4	(iii)
METAL FATIGUE	Class 1 Components	4.3.1	(ii)
	Non-Class 1 Components	4.3.2	(ii)
	Environmentally Assisted Fatigue	4.3.3	(ii)
ENVIRONMENTAL QUALIFICATION of ELECTRIC EQUIPMENT	Electrical Equipment	4.4	(iii)
CONCRETE CONTAINMENT TENDON PRESTRESS	Concrete Containment Tendon Prestress	4.5	(ii)
CONTAINMENT LINER PLATE & PENETRATIONS	Containment Liner Plate	4.6.1	(ii)
	Containment Penetrations	4.6.2	(ii)
OTHER UNIT-SPECIFIC TLAAs	Crane Load Cycle Limit	4.7.1	(ii)
	Reactor Coolant Pump Flywheel	4.7.2	(iii)
	Reactor Coolant Pump Code Case N-481	4.7.3	(iii)
	Leak-Before-Break	4.7.4	(ii)

(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.

(iii) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

Table 4.1-2 Comparison of Millstone Unit 2 to NUREG-1800 TLAAs

ITEM	NUREG-1800 TLAA LIST	APPLICABLE to MILLSTONE UNIT 2	LRA SECTION
1	Reactor vessel neutron embrittlement	Yes	Section 4.2
2	Concrete containment tendon prestress	Yes.	Section 4.5
3	Metal fatigue	Yes	Section 4.3
4	Environmental qualification of electrical equipment	Yes	Section 4.4
5	Metal corrosion allowance	No. Loss of material by corrosion of mechanical components addressed as part of the aging management review process discussed in Section 3.0.	Not Applicable
6	Inservice flaw growth analyses that demonstrate structural stability for 40 years.	No. Review of ISI records indicated no defects that required analytical evaluation of flaws to the end of the component service life.	Not Applicable
7	Inservice local metal containment corrosion analyses	No. Loss of material by corrosion of structural components addressed as a part of the aging management review process discussed in Section 3.0.	Not Applicable
8	High-energy line break postulation based on fatigue cumulative usage factor.	Yes	Section 4.7.4
9	Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic stainless steel cladding.	No. Fabrication records indicate that the reactor vessel is not susceptible to intergranular separation. ISI records indicate no separation.	Not Applicable
	Low-temperature (LTOP) analyses.	Yes	Section 4.2.4

Table 4.1-2 Comparison of Millstone Unit 2 to NUREG-1800 TLAAs

ITEM	NUREG-1800 TLAA LIST	APPLICABLE to MILLSTONE UNIT 2	LRA SECTION
10	Fatigue analyses for the main steam supply lines to the turbine driven auxiliary feedwater lines.	Yes	Section 4.3.1
11	Fatigue analysis for the reactor coolant pump flywheel.	Yes	4.7.2
12	Fatigue analysis of the polar crane	Yes	4.7.1
13	Flow-induced vibration endurance limit, transient cycle count assumptions and ductility reduction of fracture toughness for the reactor vessel internals.	Yes	4.3
14	Leak-before-break	Yes	4.7.4
15	Fatigue analysis for the Containment liner plate.	Yes	4.6.1
16	Containment penetration pressurization cycles.	Yes	4.6.2
17	Reactor vessel circumferential weld inspection relief (BWR)	No. Applicable to BWRs.	Not Applicable

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

Description

Neutron embrittlement produces changes in mechanical properties of reactor vessel materials by increasing yield strength and ultimate strength and, correspondingly, decreasing ductility and fracture toughness.

These changes in material properties result primarily from exposure to a fast neutron flux within the vicinity of the reactor core. The most pronounced material change occurs within the reactor vessel beltline region, manifesting itself as a reduction in fracture toughness. As fracture toughness decreases with cumulative fast neutron exposure, the material's resistance to crack propagation decreases once a crack has been initiated. Prevention of reactor vessel failure depends on maintaining reactor vessel fracture toughness high enough to resist brittle fracture over the period of extended operation.

The NRC has established a series of regulations to address neutron embrittlement. 10 CFR 50.60 (Reference 4.8-2) requires that licensees comply with the requirements of 10 CFR 50, Appendix G (Reference 4.8-3) and 10 CFR 50, Appendix H (Reference 4.8-4). 10 CFR 50, Appendix G requires that reactor vessel beltline materials have a Charpy upper shelf energy of not less than 50 ft-lb. through the licensed period of operation unless otherwise approved by the NRC, while 10 CFR 50, Appendix H establishes the requirements for developing plant specific surveillance data. Both 10 CFR 50, Appendix G, and 10 CFR 50.61 (Reference 4.8-5) establish limits on neutron embrittlement.

The following time-limited aging analyses are addressed within the subsequent sections:

- Section 4.2.2, Upper Shelf Energy
- Section 4.2.3, Pressurized Thermal Shock
- Section 4.2.4, Pressure-Temperature Limits (including LTOP)

4.2.1 NEUTRON FLUENCE

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 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).

4.2.2 UPPER SHELF ENERGY

Description

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 (Reference 4.8-6).

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 (Reference 4.8-7) 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 Regulatory Guide 1.99, Revision 2 (Reference 4.8-8) 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 Regulatory Guide 1.99, Revision 2, Position 1. Capsule data has been considered and determined to result in values less conservative than obtained from using Regulatory Guide 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.

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) indicate slight differences for selected materials. The most significant discrepancies are relative to initial upper shelf energy for weld seam 9-203, fabricated with weld wire heats 90136 and 10137, and Linde 0091 flux. The value of upper shelf energy documented in Table 4.2-1 is 2.2 ft-lbs 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% 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 upper shelf energy 10.5 ft-lbs 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 (Reference 4.8-39). This report has been reviewed and approved by the NRC (Reference 4.8-40).

A comparison of copper content, nickel content, and initial upper shelf energy for Millstone Unit 2 beltline materials listed in Table 4.2-1 to the values submitted to the NRC in response to Generic Letter 92-01 (Reference 4.8-7) indicate only differences for weld 9-203, heat 90136. Initial upper shelf energy for weld 9-203, heat 90136 listed in Table 4.2-1 is 21.2 ft-lb greater than the Generic Letter 92-01 value. These updated values are based on surveillance data that was identified subsequent to the issuance of the Millstone response to Generic Letter 92-01.

Conclusion

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), Option (ii). Calculated upper shelf energy values for the most limiting reactor pressure vessel beltline plate and weld materials remain greater than 50 ft-lbs.

4.2.3 PRESSURIZED THERMAL SHOCK

Description

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 following methodology was utilized in calculating RT_{PTS} values. This methodology is also consistent with Regulatory Guide 1.99, Revision 2 (Reference 4.8-8) requirements.

$$RT_{PTS} = RT_{NDT} \text{ (unirradiated/initial)} + M + [(CF) * (FF)]$$

- RT_{NDT} is the reference temperature for the reactor pressure vessel material in the unirradiated/initial condition.
- M is the margin added to account for uncertainties in the value of RT_{NDT}.
- CF is the chemistry factor which accounts for the effects of copper and nickel content on radiation embrittlement.
- FF, fluence factor, is the projected end-of-life peak exposure for that material at the inside surface of the vessel.

The product [(CF) * (FF)] is also known as ΔRT_{PTS}.

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.

A comparison of copper content, nickel content and initial RT_{NDT} Millstone Unit 2 beltline materials listed in 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 Table 4.2-2 to the values submitted to the NRC in response to Generic Letter 92-01 (Reference 4.8-7) indicate slight differences for selected materials. 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 Generic Letter 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 Generic Letter 92-01 value. These updated values are based on original qualification data that was identified subsequent to the issuance of the Millstone response to Generic Letter 92-01.

Conclusion

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), Option (ii).

4.2.4 PRESSURE-TEMPERATURE LIMITS

Description

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.

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 concurrently with the pressure-temperature limits in order to ensure that these limits are not exceeded for postulated plant transients during the period of extended operation.

Conclusion

Consistent with 10 CFR 54.21(c)(1), Option (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.

Table 4.2-1 Millstone Unit 2 - Upper Shelf Energy Values at 54 EFPY

Material Description				Cu Wt.%	Initial USE Ft-lbs	Fluence 1/4t E19 n/cm^2	USE[1] Ft-lbs	% Drop USE
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type					
Intermediate Shell	C-505-1	C5843-1	SA-533B Cl. 1	0.13	88.1	2.30	64.8	26.5
Intermediate Shell	C-505-2	C5843-2	SA-533B Cl. 1	0.13	89.3	2.30	65.6	26.5
Intermediate Shell	C-505-3	C5843-3	SA-533B Cl. 1	0.13	94.6	2.53	68.8	27.3
Lower Shell	C-506-1	C5667-1	SA-533B Cl. 1	0.15	108.0	2.41	76.1	29.5
Lower Shell	C-506-2	C5667-2	SA-533B Cl. 1	0.15	86.1	2.41	60.7	29.5
Lower Shell	C-506-3	C5518-1	SA-533B Cl. 1	0.14	88.1	2.41	63.0	28.5
Mid. Circumferential Weld	9-203	90136	Linde 0091	0.27	132.2	2.41	68.7	48.0
Mid. Circumferential Weld	9-203	10137	Linde 0091	0.22	132.2	2.41	74.0	44.0
Int. Longitudinal Welds	2-203A, B, C	A8746	Linde 124	0.15	83.5	1.96	54.3	35.0
Lower Longitudinal Weld	3-203A, B, C	A8746	Linde 124	0.15	83.5	1.96	54.3	35.0

1. Regulatory Guide 1.99, Revision 2, Position 1

Table 4.2-2 Millstone Unit 2 - RT_{PTS} Values at 54 EFPY

Material Description				Chemical Composition		Initial RT_{NDT} °F	Chemistry Factor °F	Inner Surface Fluence E19 n/cm^2	Margin °F	ΔRT_{PTS} °F	RT_{PTS} °F
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type	Cu Wt.%	Ni Wt.%						
Intermediate Shell	C-505-1	C5843-1	SA-533B Cl. 1	0.13	0.61	8.1[1]	91.3[2]	3.86	34.0	123.1	165.2
Intermediate Shell	C-505-2	C5843-2	SA-533B Cl. 1	0.13	0.62	17.5[1]	91.5[2]	3.86	34.0	123.4	174.9
Intermediate Shell	C-505-3	C5843-3	SA-533B Cl. 1	0.13	0.62	5.0[1]	91.5[2]	4.25	34.0	125.3	164.3
Lower Shell	C-506-1	C5667-1	SA-533B Cl. 1	0.15	0.60	7.0[1]	110.0[2]	4.05	34.0	149.5	190.5
Lower Shell	C-506-2	C5667-2	SA-533B Cl. 1	0.15	0.61	-33.7[3]	110.0[2]	4.05	34.0	149.5	149.8
Lower Shell	C-506-3	C5518-1	SA-533B Cl. 1	0.14	0.66	-19.2[3]	101.5[2]	4.05	34.0	137.9	152.7
Mid. Circ. Weld	9-203	90136	Linde 0091	0.27	0.07	-56.3[1]	124.3[2]	4.05	56.0	168.9	168.6

Table 4.2-2 Millstone Unit 2 - RT_{PTS} Values at 54 EFPY

Material Description				Chemical Composition		Initial RT_{NDT} °F	Chemistry Factor °F	Inner Surface Fluence E19 n/cm2	Margin °F	ΔRT_{PTS} °F	RT_{PTS} °F
Reactor Vessel Beltline Region Location	Matl. Ident.	Heat Number	Type	Cu Wt.%	Ni Wt.%						
Mid. Circ. Weld	9-203	10137	Linde 0091	0.22	0.04	-56.3[4]	100.0[2]	4.05	56.0	135.9	135.6
Int. Long. Welds	2-203A, B, C	A8746	Linde 124	0.15	0.13	-56.0[4]	77.7[2]	3.29	66.0	102.0	112.0
Lower Long. Weld	3-203A, B, C	A8746	Linde 124	0.15	0.13	-56.0[4]	77.7[2]	3.29	66.0	102.0	112.0

1. Measured Value

2. Regulatory Guide 1.99, Revision 2, Position 1

3. MTEB 5-2 Positions 1.1(3)(b) and 1.2

4. Generic

4.3 METAL FATIGUE

Fatigue is defined as structural deterioration that can occur through repeated stress or strain cycles resulting from fluctuations in loads and/or temperatures. After repeated cyclic loading of sufficient magnitude, micro-structural damage can accumulate leading to microscopic crack initiation at the most highly affected locations. Fatigue cracks typically initiate at points of maximum local stress ranges and minimum local strength. Further cyclic mechanical and/or thermal loading can lead to crack growth.

Fatigue represents an aging mechanism. As such, fatigue evaluations represent a time-limited aging analysis even though the system, structure and component design limits are based upon the number of cycles and the associated fatigue (cumulative) usage factors rather than specific time limits.

4.3.1 MILLSTONE UNIT 2 CLASS 1 COMPONENTS

Description

Components within the Millstone Unit 2 nuclear steam supply system are subject to a wide variety of varying mechanical and thermal loads that contribute to fatigue accumulation. The Reactor Coolant System components are designed in accordance with ASME *Boiler and Pressure Vessel Code*, Section III (Reference 4.8-10) and ANSI Standard B31.7 (Reference 4.8-11). A number of major primary system components and their associated design codes are identified within Table 4.3-1. Further code information is contained within FSAR Section 4.1. Use of these codes require that design analyses for Class A (Class 1) systems and components address fatigue and the establishment of load limits to preclude initiation of fatigue cracks. ASME, Section III Class A and Class 1 designations are equivalent, simply representing a change in nomenclature based upon code year. Additionally, there is no essential difference between components designed or operated to ASME Section III Class 1 versus ANSI Standard B31.7 Class 1 requirements.

The type and number of Reactor Coolant System design transients are identified in Table 4.3-2. The current number of cycles is determined through cycle counting, except in those instances when the transients have been determined to produce insignificant fatigue usage factors. The projected 60-year transient cycles were derived from the current number of transient cycles. Current cycles are counted either manually or automatically using FatiguePro software through the unit process computer. The Electric Power Research Institute FatiguePro System, which includes FatiguePro software, provides a simplified method of evaluating fatigue usage accumulation at critical locations using existing instrumentation and available unit operating data. Stress-based fatigue monitoring is employed at Millstone Unit 2.

Stress-based fatigue monitoring consists of computing a current stress history for a given component from actual temperature, pressure and flow histories. This methodology is intended for those high fatigue components (e.g., pressurizer surge line) where a more refined approach is necessary to demonstrate long-term structural acceptability or where thermal transients are not well defined in terms of specific unit events.

. The fatigue design bases (e.g., design transients) for Millstone Unit 2 has been reviewed and found to be acceptable for the 60-year license renewal period.

NRC Bulletin 88-08 (Reference 4.8-33) identified a concern regarding potential temperature stratification or temperature oscillations in unisolable sections of piping attached to the reactor coolant system. Based upon the Millstone Unit 2 response (Reference 4.8-34) and supplemental communications, the NRC concluded that Millstone Unit 2 meets the requirements of Bulletin 88-08 (Reference 4.8-35). These results have been reviewed and found acceptable for the period of extended operation.

Pressurizer surge line thermal stratification was a concern raised by the NRC in Bulletin 88-11. One of the requirements of this bulletin was to analyze the effects of thermal stratification on surge line integrity. These analyses were collectively performed as a Combustion Engineering Owners Group task (Reference 4.8-36), supplemented by additional unit specific inspections and activities. Based upon the Combustion Engineering Owners Group task, the NRC concluded that the owners group analysis CEN-387-P is bounding for thermal stratification and thermal striping (Reference 4.8-37). Confirmation that this analysis is bounding for Millstone Unit 2 and confirmation that the actions required by Bulletin 88-11 have been completed was provided to the NRC (Reference 4.8-38).These results have been reviewed and found acceptable for the period of extended operation.

The Millstone Unit 2 pressurizer surge line and pressurizer lower head has been evaluated for the effects of thermal stratification. Forced pressurizer spray (e.g., for boron equalization) has been utilized at Millstone Unit 2 since initial operation. Considering the number of Reactor Coolant System heatup and cooldown design cycles, acceptable fatigue usage factors have been identified over the 60-year license renewal period.

Conclusion

The evaluation of these components represents a time-limited aging analysis per 10 CFR 54.3 since the evaluations involve the use of time-limited assumptions such as thermal and pressure transients, and operating cycles.

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable thermal and pressure transients, and operating cycles have been projected for ASME Section III Class A, Class 1 and ANSI Standard B31.7 Class 1 components though the period of extended operation.

4.3.2 NON-CLASS 1 COMPONENTS

Description

Non-Class 1 components can include ASME Section III Classes 2 and 3, ANSI Standard B31.7 Classes 2 and 3, and ANSI Standard B31.1 (Reference 4.8-12) piping and tubing. Piping systems (e.g. sample lines) designed to these requirements incorporate a stress range reduction factor to conservatively address the effects of thermal cycling on fatigue. No reduction in allowable stress is required when the piping system will not exceed a value of 7,000 full-temperature thermal cycles during its service life. As an illustration, a value of 7,000 represents a situation in which a piping system is thermally cycled approximately once every 3 days over a 60-year period of operation.

Three piping systems have been projected to exceed 7,000 full-temperature thermal cycles over the 60-year period of extended operation. The hot leg and pressurizer steam space sample lines are projected to experience 9,360 full-temperature thermal cycles. The common sample line is projected to experience 18,720 thermal cycles. For these three systems (hot leg sample line, pressurizer steam space sample line, and the common hot leg/pressurizer steam space line), the allowable expansion stresses were recalculated to incorporate the stress range reduction factors appropriate for the projected number of cycles. These three systems were found to be acceptable for the period of extended operation since actual expansion stresses did not exceed the allowable expansion stresses.

Conclusion

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable numbers of thermal cycles have been projected to the end of the period of extended operation.

4.3.3 ENVIRONMENTALLY ASSISTED FATIGUE

Description

The evaluation of environmentally assisted fatigue involves the use of time-limited assumptions and information such as design and thermal cycles. Even though these evaluations involve the use of time-limited assumptions, they do not represent a time-limited aging analysis since they do not meet all six requirements of 10 CFR 54.3. Specifically, environmentally assisted fatigue is not contained or incorporated in the unit's current licensing basis. However, some of these evaluations were found to affect fatigue analysis, resulting in a number of NRC generic communications (e.g., Generic

Safety Issue-190, proposed Interim Staff Guidance-16). NRC concerns related to environmentally assisted fatigue are presented in the following discussion.

Recent test data indicates that the effect of a reactor coolant environment (e.g., the inter-relationships of stress or strain, temperature, flow, sulfur, and oxygen) could result in greater susceptibility to fatigue than would be predicted by fatigue analyses based upon ASME Section III design fatigue curves. The ASME design fatigue curves were based on laboratory tests in air at low temperatures. Even though the failure curves derived from laboratory tests were adjusted to account for effects such as data scatter, size effects and surface finish, the NRC remained concerned that these adjustments may not be sufficient to account for the actual plant operating environment. The effect of reactor coolant environment on fatigue is generally referred to as environmentally assisted fatigue.

In order to specifically address environmentally assisted fatigue, the NRC implemented an action plan to systematically assess fatigue issues in operating units. The results of this action plan are documented in SECY-95-245. As reported in SECY-95-245, the NRC believes that no immediate staff or licensee action is necessary to deal with the fatigue issues addressed by the fatigue action plan. The NRC concluded that it could not justify requiring a backfit of the environmental fatigue data to operating units. However, in recognition of the fact that metal fatigue effects increase with service life, the NRC identified that the action plan fatigue issues need to be evaluated for the period of extended operation. As part of the resolution of GSI-166 (Reference 4.8-24), which resulted in the initiation of GSI-190 (Reference 4.8-25), the NRC will consider the need to evaluate a sample of components of high fatigue usage using the latest available environmental fatigue data.

The NRC, through GSI-190 identified a concern associated with the potential effects of reactor water environment on reactor coolant system component fatigue life. Resolution of these concerns was, in part, based on the results of NUREG/CR-6674 (Reference 4.8-23). This PNNL study examined design-basis transients on the probability of fatigue failure over 60 years of plant operation and the relationship of fatigue failure to core damage. The PNNL study concluded that the environmental effects of reactor water on fatigue curves had an insignificant contribution to core damage frequency. However, the study indicated that reactor water environmental effects would result in an increased frequency of pipe leakage. Specifically, some components would have a cumulative probability of crack initiation or cumulative usage factor approaching 1.0 over a 40- to 60-year period of operation. With this increased frequency of piping leakage, the NRC adopted the position that licensees who apply for license renewal need to address the effects of reactor coolant environment on component fatigue life.

As part of an industry effort to address environmental effects on operating nuclear power plants during the current 40-year licensing term, Idaho National Engineering Laboratories evaluated fatigue-sensitive component locations at plants designed by all four domestic NSSS vendors. These evaluations are presented and discussed in NUREG/CR-6260 (Reference 4.8-26). The evaluations associated with the newer-vintage Combustion Engineering units are applicable since the majority of the Millstone Unit 2 Class 1 systems and components were designed to ASME Section III requirements.

The second activity involved the evaluation of the influence of the reactor water environment on the cumulative usage factor of the following representative components identified in NUREG/CR-6260 for the period of extended operation, using the most recent laboratory data and methods:

- Reactor vessel shell and lower head.
- Reactor vessel inlet and outlet nozzles.
- Surge line.
- Charging system nozzle.
- Safety injection system nozzle.
- Shutdown cooling line.

These fatigue-sensitive locations have been evaluated using the methods identified in NUREG/CR-6583 (Reference 4.8-27), and NUREG/CR-5704 (Reference 4.8-28). Utilizing Millstone Unit 2 cyclic and transient information, all six fatigue sensitive component locations were determined to be acceptable for the period of extended operation. Results of this evaluation are presented in Table 4.3-3. No additional action is required.

Conclusion

The evaluation of environmentally assisted fatigue involves the use of time-limited assumptions and information such as design cycles and thermal cycles. Even though these evaluations involve the use of time-limited assumptions, they do not represent a time-limited aging analysis since they do not meet all six requirements of 10 CFR 54.3.

The effects of environmentally assisted fatigue for the limiting conditions identified in NUREG-6260 have been evaluated and found acceptable for the period of extended operation. Consistent with 10 CFR 54.21(c)(1), Option (ii), the analyses have been projected to the end of the period of extended operation.

Table 4.3-1 Millstone Unit 2 Code Case Identification

COMPONENTS	CODES
Reactor Pressure Vessel	ASME, Section III Class A, 1968 Edition, Addenda through Summer 1969.
Pressurizer	ASME, Section III Class A, 1968 Edition, Addenda through Summer 1969.
Steam Generators (original upper domes)	ASME, Section III Class A, 1968 Edition, Addenda through Summer 1969.
Steam Generators (replacement lower sections)	ASME, Section III Class 1, 1983 Edition, Addendum to Summer 1984.
Reactor Coolant Pumps	Draft ASME Code for Pumps and Valves for Nuclear Power, Class 1, November 1968 including March 1970 Addenda. ASME, Section III, Paragraph N153 in Summer 1969 Addenda. ASME, Section III, Appendix IX.
Pressurizer Safety Valves (original)	ASME, Section III Class A, 1968 Edition, Addendum through Summer of 1970, Code Case 1344-1.
Pressurizer Safety Valve (spare)	ASME, Section III Class 1, 1971 Edition, Addendum through Winter of 1972.
Piping	ANSI Standard B31.7, Class 1, 1969 Edition. ASME, Section III, Paragraph N153 in Summer 1969 Addenda. ANSI Standard B31.7, Code Case 70.

Table 4.3-2 Millstone Unit 2 - 60-Year Projected Transient Cycles

Number	Transient Description Summary[1]	FSAR Design Cycles	Unit 2 Current Cycles[2]	Unit 2 Projected Cycles[3]
Normal Transients				
1	RCS heatup at 100°F/hr	500	61	135
2	RCS cooldown at 100°F/hr	500	61	135
3	Pressurizer cooldown at 200°F/hr	160	61	135
4	Loading at 5% of full power/min	15,000	N/C[4]	Not Computed
5	Unloading at 5% of full power/min	15,000	N/C[4]	Not Computed
6	Step load increase of 10% of full power	2,000	N/C[4]	Not Computed
7	Step load decrease of 10% of full power	2,000	N/C[4]	Not Computed
8	Replacement SG primary manway stud preloading	80	4	21
9	Replacement SG manway stud load change of 5%/min decreasing and 30%/hr increasing	1,000	N/C[4]	Not Computed
10	Replacement SG primary manway stud 10% of full power step changes increasing from 15% to 90% and decreasing from 100% to 15%	1,500	N/C[4]	Not Computed
11	Replacement SG primary manway stud trips from 100% power	200	17	35
12	Replacement SG primary manway stud heatup and cooldown cycles at 100°F/hr	200	17	60
13	Steady state pressure fluctuations (±100 psi)	1.0 E6	N/C[4]	Not Computed

Table 4.3-2 Millstone Unit 2 - 60-Year Projected Transient Cycles

Number	Transient Description Summary[1]	FSAR Design Cycles	Unit 2 Current Cycles[2]	Unit 2 Projected Cycles[3]
Upset Transients				
14	Loss of turbine load from 100% power	40	2	5
15	Loss of RCS flow	40	1	3
16	Trips from 100% power	400	135	298
Test Transients				
17	Hydrostatic testing before initial startup @3110 psig	10	2	3
18	Primary side leak testing @2485 psig	200	61	135
19	Replacement SG manway stud leak testing @2485psig	80	17	60
Emergency Transients				
20	Complete loss of secondary pressure	5	0	0[5]

1. Transient descriptions and design cycle information contained in FSAR Section 4.2.

2. Current cycles: 09/26/75 through 12/31/02.

3. Projected cycles: current cycles * (60) ÷ (12/31/02 - 09/26/75).

4. N/C: cycles not counted. The transient produces insignificant fatigue usage contributions to any Class 1 component.

5. No transient expected.

Table 4.3-3 Comparison of Millstone Unit 2 to NUREG-6260 Locations

NUREG-6260 Location	CUF[1]	F_{en}[2] (EAF Factor)	CUF_{EAF}[3]
Reactor vessel head-to-shell juncture (low-alloy steel)	0.0098	2.53	0.0248
Reactor vessel outlet nozzle (low-alloy steel)	0.0459	2.53	0.1162
Reactor vessel inlet nozzle (low-alloy steel)	0.0696	2.53	0.1761
Pressurizer surge line (stainless steel)	0.0513	15.35	0.7873
Charging System nozzle (low-alloy steel)	0.3545	2.53	0.8976
Safety Injection System nozzle (low-alloy steel)	0.1660	2.53	0.4204
Shutdown cooling line (stainless steel)	0.0356	15.35	0.5465

1. CUF represent cumulative usage factors.

2. F_{en} (fatigue life correction) factors for environmentally assisted fatigue were developed from data contained in NUREG/CR-6583 (carbon/low-alloy steel) and NUREG/CR-5704 (stainless steel). The EAF Factors of 2.53 and 15.35 represent maximum values.

3. CUF_{EAF} represent cumulative usage factors for 60 years. CUF_{EAF} is calculated as CUF * F_{en}.

4.4 ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT

Description

Electrical Equipment Qualification 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 Appendix B, Section B3.1, Electrical Equipment Qualification.

10 CFR Part 50 requires that certain categories of systems, structures and components 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 of these categories of electrical equipment are embodied within 10 CFR 50.49 (Reference 4.8-13). 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 time-limited aging analysis. 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., 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. Electric 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, EQ zone changes, changes to the qualification bases). Plant modification and events which impacted temperature and radiation values that were used in the underlying assumptions in the EQ calculations have been reviewed in the Operating Experience section of Appendix B, Section B3.1, Electrical Equipment Qualification. Guidance relating to the methods and procedures for implementing the requirements of 10 CFR 50.49 is contained within Regulatory Guide 1.89 (Reference 4.8-14). Further guidance for post-accident monitoring equipment is contained within Regulatory Guide 1.97 (Reference 4.8-15).

Conclusion

The assessment (e.g., analysis, evaluation, or calculation) of electrical equipment in accordance with 10 CFR 50.49 involves the use of time-limited assumptions such as thermal life, total radiation dose, humidity, component cycling, and chemical exposure. These assessments also meet the requirements of 10 CFR 54.3 and, as such, represent time-limited aging analyses. Consistent with 10 CFR 54.21(c)(1), Option (iii), environmental qualification of electrical equipment will be adequately managed by the Electrical Equipment Qualification program for the period of extended operation.

4.5 CONCRETE CONTAINMENT TENDON PRESTRESS

Description

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 evaluation of containment tendon examination and surveillance test results involves 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 can be found in Table 4.5-1, Table 4.5-2, and Table 4.5-3. These results and projections beyond 25 years are compared to design minimum requirements and the bounding 60-year 95% 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. Containment tendon examinations are performed in accordance with Millstone Unit 2 Technical Specification requirements. This evaluation meets the requirements of 10 CFR 54.3 and, as such, represents a time-limited aging analysis.

Conclusion

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable losses in Containment tendon prestress have been projected to the end of the period of extended operation.

Table 4.5-1 Post-Tensioning Projections -- Incorporating 25-Year Surveillance Results -- Dome Tendons

Year	Value (kips)	95% Confidence
Actual Data		
1	1615	1584
3	1566	1547
5	1544	1529
10	1514	1502
15	1496	1483
20	1483	1469
25	1474	1458
Projected Data		
30	1466	1448
35	1459	1440
40	1453	1433
45	1448	1427
50	1443	1421
55	1439	1416
60	1435	1411

Minimum requirements - 1308 kips

Table 4.5-2 Post-Tensioning Projections -- Incorporating 25-Year Surveillance Results -- Horizontal Tendons

Year	Value (kips)	95% Confidence
Actual Data		
1	1623	1595
3	1576	1559
5	1555	1541
10	1525	1512
15	1508	1493
20	1496	1479
25	1486	1468
Projected Data		
30	1479	1459
35	1472	1451
40	1467	1444
45	1462	1437
50	1457	1432
55	1453	1427
60	1449	1422

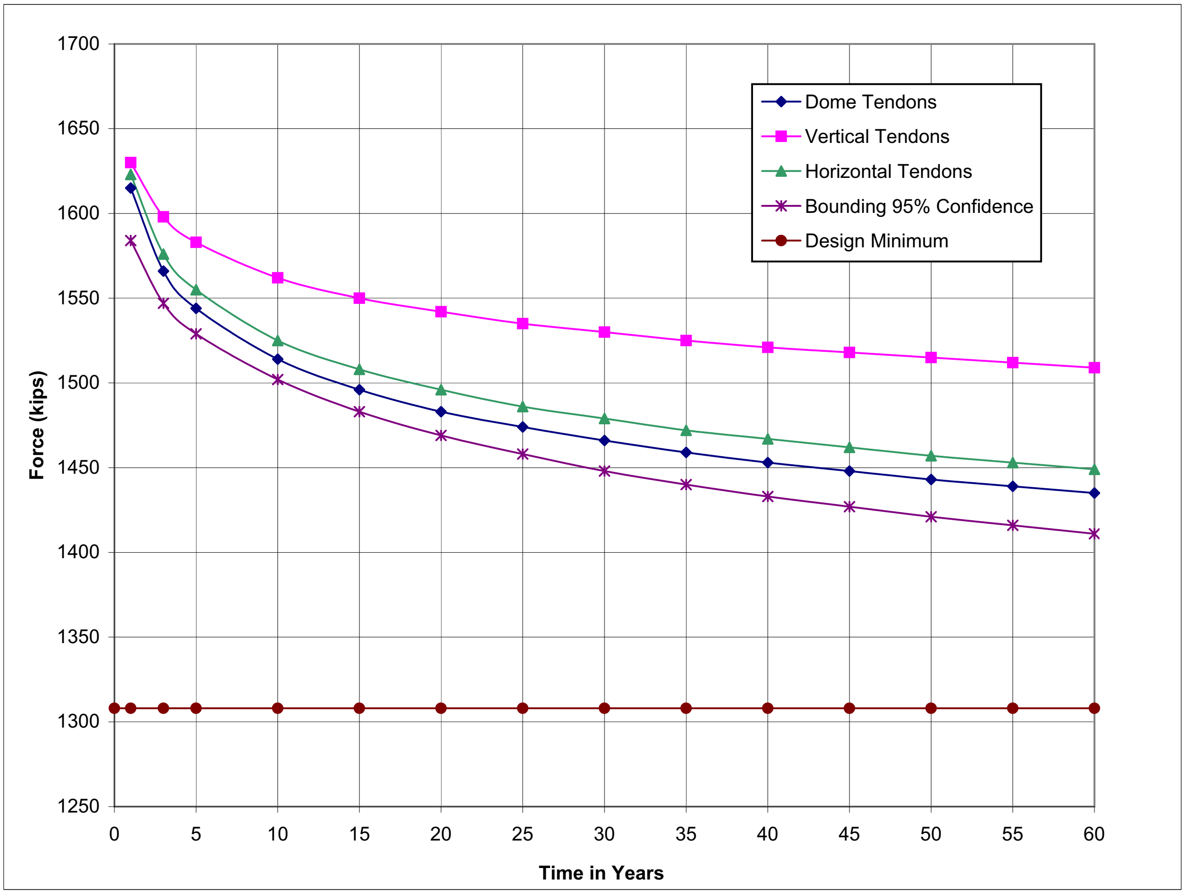
Minimum requirements - 1308 kips

Table 4.5-3 Post-Tensioning Projections -- Incorporating 25-Year Surveillance Results -- Vertical Tendons

Year	Value (kips)	95% Confidence
Actual Data		
1	1630	1558
3	1598	1553
5	1583	1548
10	1562	1536
15	1550	1523
20	1542	1512
25	1535	1502
Projected Data		
30	1530	1493
35	1525	1486
40	1521	1479
45	1518	1473
50	1515	1467
55	1512	1462
60	1509	1458

Minimum requirements - 1308 kips

Figure 4.5-1 Millstone Unit 2 Containment Post-Tensioning Regression Analysis



4.6 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

4.6.1 CONTAINMENT LINER PLATE

Description

Millstone Unit 2 has a prestressed, post-tensioned concrete Containment surrounded by an enclosure building. A welded carbon steel liner plate is attached to the inside surface of the concrete. Both the liner plate and the penetration sleeves are designed to serve as the primary Containment leakage barrier. Components of the liner plate include penetration sleeves, access openings, piping penetrations, and electrical penetrations.The Containment design considered the composite action of the liner and the concrete structure and includes the transient effects on the liner due to temperature changes (e.g. normal operation, seasonal). Stability of the liner is achieved by anchoring it to the concrete structure. At all penetration sleeves, the liner is thickened to reduce stress concentrations, based on the 1968 ASME Code, Section III, for Class B vessels. The thickened portions of the liner are then anchored to the concrete.

In isolated areas, the liner plate has an initial inward curvature due to fabrication and erection tolerances and inaccuracies. The anchors are designed to resist the forces and moments induced when a section of liner plate between anchors has initial inward curvature while the adjacent panels have no such curvature. As a result, inward deformation of the liner plate between anchors may occur under both operating and accident conditions. The liner and the anchors are designed with sufficient ductility to undergo displacement to relieve the loads without failure.

The following fatigue loads were considered in the design of the liner plate and are considered a time-limited aging analyses for the purposes of license renewal:

1. Thermal cycling due to annual outdoor temperature variations. The number of cycles for this loading is 40 for the plant life of 40 years.
2. Thermal cycling due to Containment interior temperature varying during the startup and shutdown of the reactor system. The number of cycles for this loading is 500.
3. Thermal cycling due to the design basis accident is one cycle.

Each of the above items has been evaluated for the period of extended operation. For item one, the number of thermal cycles due to annual outdoor temperature variations was increased from 40 to 60 for the extended period of operation. The effect of this increase is insignificant in comparison to the assumed 500 thermal cycles due to Containment interior temperature varying during heatup and cooldown of the Reactor Coolant System. The 500 thermal cycles includes a margin of 300 thermal cycles above the 200 Reactor Coolant System allowable design heatup and cooldown cycles, which is sufficient margin to accommodate the additional 20 cycles of annual outdoor temperature variation. Therefore, this loading condition is considered valid for the period of extended operation as it is enveloped by item two.

For item two, the 500 thermal cycles was evaluated based on the more limiting heatup and cooldown design cycles (transients) for the Reactor Coolant System. The Reactor Coolant System was designed to withstand 200 heatup and cooldown thermal cycles. The originally projected number of maximum Reactor Coolant System design cycles is conservative enough to envelop the projected cycles for the extended period of operation. Therefore, the original containment liner plate fatigue analysis for 500 heatup and cooldown cycles is considered valid for the period of extended operation.

For item three, the value for thermal cycling due to the maximum hypothetical accident remains valid. No maximum hypothetical accident has occurred and none is expected, therefore, this value is considered valid for the period of extended operation.

Conclusion

Evaluations of the Containment liner plate involve the use of time-limited assumptions such as thermal cycles. These evaluations also meet the requirements of 10 CFR 54.3 and, as such, represent time-limited aging analyses.

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable analyses have been projected to the end of the period of extended operation.

4.6.2 CONTAINMENT PENETRATIONS

Description

All Millstone Unit 2 Containment penetrations are pressure resistant, leak-tight, welded assemblies, fabricated, installed, inspected, and tested in accordance with ASME Nuclear Vessel Code, Section III (Reference 4.8-10) and ANSI Nuclear Piping Code B31.7 (Reference 4.8-11).

All liner plate components which must resist full design pressure (e.g., penetration sleeves and access openings) meet the requirements of paragraph N-1211, of ASME Section III, Nuclear Vessels, 1968 Edition, with one exception. The exception is external bolting attachments to the equipment hatch; these attachments are designed to the requirements of ASME Section III, Subsection NE, 1986 Edition. The thickness of the liner plate has been increased at penetration sleeve locations, in order to reduce localized stress, in accordance with the requirements of ASME Section III, 1968 Edition, for Class B vessels. Penetration sleeves are welded to the liner plate and embedded in the concrete Containment wall. All piping passing through the Containment wall is permanently welded to the penetration sleeves. The evaluation for mechanical penetrations includes the penetration assembly and the weld to the process piping, but does not include the process piping within the penetration. Welding and welding procedures conform to the requirements of ASME Section XI, and ASME Section III, 1971 Edition, Nuclear Vessels. Electrical penetrations carry the NPT Stamp in accordance with ASME Section III, 1971 Edition. Medium voltage electrical penetration assemblies are designed to the requirements of IEEE 317 (Reference 4.8-17), 1971 Edition. Low voltage power and control module penetrations are designed to the requirements of IEEE Standard 317, 1976 Edition.

Containment liner plate penetrations (e.g., main steam, main feedwater) were designed for 10 cycles of operating thermal load plus rupture load and 100 cycles of operating load plus thermal load. These cycles have been evaluated and found to be acceptable for the period of extended operation.

Conclusion

Evaluations of Containment liner plate components involve the use of time-limited assumptions such as thermal cycles. These evaluations meet the requirements of 10 CFR 54.3 and, as such, represent time-limited aging analyses.

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable analyses have been projected to the end of the period of extended operation.

4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

4.7.1 CRANE LOAD CYCLE LIMIT

Description

The following are examples of the types of cranes within the scope of license renewal. These cranes were designed in accordance with, or reconciled to, the guidance contained in NUREG-0612 (Reference 4.8-18).

- Containment polar crane
- Spent fuel crane
- Monorails

NUREG-0612 requires that the design of heavy-load, overhead handling systems meet the intent of Crane Manufacturers Association of America, Inc., Specification No. 70 (Reference 4.8-19). Overhead cranes designed to Specification No. 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 Institute Specification No. 61, (Reference 4.8-20). This design was subsequently reconciled to the guidance contained in NUREG-0612 (Reference 4.8-45).

Conclusion

The most frequently used crane is the spent fuel crane. The spent fuel crane will 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. Considering all of 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 Crane Manufacturers Association of America, Inc. Specification No. 70.

The evaluation of crane loads represents a time-limited aging analysis per 10 CFR 54.3 since it involves the use of a time-limited assumption, load cycles. Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable crane load cycles have been projected to the end of the period of extended operation.

4.7.2 REACTOR COOLANT PUMP FLYWHEEL

Description

The reactor coolant pump 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 reactor coolant pump flywheels develop sufficient kinetic energy to produce high-energy missiles in the event of failure. Conditions that may result in over-speed of the pump increases both the potential for failure and the kinetic energy of the flywheel. These concerns ultimately led the NRC to issue Regulatory Guide 1.14 (Reference 4.8-21). One of the recommendations of RG 1.14 is the regular volumetric inspection of flywheels. These inspections, performed at 3- and 10-year intervals, are significant in terms of time, expense, and personnel dose.

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(1), requirements to those identified in Regulatory Position C.4.b(2). The NRC has reviewed and accepted SIR-94-080A(Reference 4.8-22), subject to certain conditions, for referencing in license applications. Using this evaluation, the NRC issued Amendment No. 264 consistent with RG 1.14, Revision 1, Regulatory Position C.4.b(2), to allow the examination of each reactor coolant pump flywheel at least once every 10-years, coinciding with the ASME Section XI inservice inspection program schedule.

Conclusion

The evaluation of 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), Option (iii), reactor coolant pump flywheel fatigue cracking will be adequately managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.

4.7.3 REACTOR COOLANT PUMP CODE CASE N-481

Description

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 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.

Conclusion

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), Option (iii), acceptable reactor coolant pump casing will be managed by the Inservice Inspection Program: Systems, Components and Supports for the period of extended operation.

4.7.4 LEAK-BEFORE-BREAK

Description

The NRC developed the philosophy of Leak-Before-Break (LBB) behavior for high-energy piping systems in the early 1980s. This philosophy was used in certain evaluations stemming from Unresolved Safety Issue A-2, *Asymmetric Loads on PWR Primary Systems*. The LBB philosophy was subsequently expanded and applied to resolving issues regarding defined dynamic effects from high-energy piping system ruptures. 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 Procedure*s.

In its original form, General Design Criteria (GDC) 4, *Environmental and Missile Design Base*s, required that systems, structures and components important to safety be protected against the dynamic effects of missiles, pipe whip, and discharging fluids that may result from a design basis loss of coolant accident. Application of GDC 4 in its original form required the implementation of significant and costly protective measures, which in certain situations, actually resulted in decreased plant safety. As a result, GDC 4 was subsequently modified to allow the use of LBB methodology for excluding the dynamic effects of postulated ruptures in reactor coolant system piping.

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 effect of thermal embrittlement on cast austenitic stainless steel through the period of extended operation is also considered. Application of LBB is limited to those high-energy fluid systems not considered to be overly susceptible to failure from such mechanisms as corrosion, water hammer, fatigue, thermal aging; or indirectly from such causes as missile damage or the failure of nearby components. Specifically, a LBB analysis needs to demonstrate that the probability of a pipe rupture is extremely low under design basis conditions, consistent with the high-energy fluid system.

Results of the ABB Combustion Engineering Owners Group evaluation, CEN-367-A, demonstrated that if a crack were to occur within the Millstone Unit 2 Reactor Coolant System piping (a Group 1 plant), the crack would be detectable, remain stable, and not result in a double-ended tube rupture, guillotine break, or unstable slot break. Based on NRC review of these evaluations and results (References 4.8-29, and 4.8-30) LBB behavior remains applicable for the Millstone Unit 2 reactor coolant loop piping over the current 40-year license period.

Supplemental LBB evaluations of Millstone Unit 2 reactor coolant piping were performed following steam generator replacement. A revised LBB evaluation of the Millstone Unit 2 cold leg (and crossover) piping (Reference 4.8-30) was performed following steam generator replacement because the combined loads (e.g., dead weight, thermal, and design bases earthquake) were found to be no longer enveloped by those utilized for Group 1 plants within CEN-367-A. The combined loads for the reactor coolant hot leg piping continued to be enveloped by those utilized within CEN-367-A.

The revised LBB evaluation for the Millstone Unit 2 cold leg (and crossover) piping, along with additional supporting information (Reference 4.8-31), was used by the NRC in reanalyzing the LBB status of the Millstone Unit 2 reactor coolant piping. Following review of this information, the NRC concluded (Reference 4.8-32) that the LBB behavior of the primary system cold leg (and crossover) piping has been effectively addressed by the revised evaluations. The NRC also stated that the Millstone Unit 2 hot leg piping continues to remain enveloped by CEN-367-A. The number and characteristics of cycles identified in CEN-367-A have been reviewed and found acceptable for the period of extended operation.

Conclusion

LBB evaluations and calculations represent a time-limited aging analysis per 10 CFR 54.3 since they involve the use of time-limited assumptions (e.g., transient cycles, crack growth rates, cumulative or fatigue usage factors, thermal embrittlement) in determining the acceptability of critical systems, structures or components for continued service.

Consistent with 10 CFR 54.21(c)(1), Option (ii), acceptable LBB evaluations have been projected to the end of the period of extended operation.

4.8 REFERENCES

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4.8-3 Appendix G, 10 CFR 50, *Fracture Toughness Requirement*s, Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4.8-4 Appendix H, 10 CFR 50, *Reactor Vessel Material Surveillance Requirements,* Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4.8-5 10 CFR 50.61 *Fracture Toughness Requirements for Protection against Pressurized Thermal Shoc*k, Code of Federal Regulations, U. S. Nuclear Regulatory Commission.

4.8-6 Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, ASME Boiler and Vessel Pressure Code, American Society of Mechanical Engineers, July 1986.

4.8-7 Generic Letter 92-01, Revision 1, Supplement 1, *Reactor Vessel Structural Integrity*, U. S. Nuclear Regulatory Commission.

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4.8-18 NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants*, Nuclear Regulation, U.S. Nuclear Regulatory Commission, Washington, D.C.

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APPENDIX A FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

Contents

A1.0 INTRODUCTION

The application for a renewed operating license is required by 10 CFR 54.21(d) to include a FSAR Supplement. This appendix, which includes the following sections, comprises the FSAR supplement:

- Section A1.0 contains a listing of the aging management programs and the status of the program at the time the License Renewal Application was submitted.
- Section A2.0 contains a description of the programs for managing the effects of aging.
- Section A3.0 contains the evaluation of Time-limited Aging Analyses (TLAAs) for the period of extended operation.
- Section A4.0 contains a summarized description of the programs that support the TLAAs.
- Section A5.0 contains a summarized description of the plant-specific exemptions.
- Section A6.0 contains a matrix of the license renewal commitments.

The integrated plant assessment for license renewal identified new and existing aging management programs necessary to provide reasonable assurance that components within the scope of license renewal will continue to perform their intended functions consistent with the Current Licensing Basis (CLB) for the period of extended operation. The period of extended operation is defined as 20 years from the unit's current operating license expiration date.

A listing of the abbreviations used in this appendix is provided in Section 1.4.

A1.1 AGING MANAGEMENT PROGRAMS

The aging management programs for Millstone Unit 2 are described in the following sections. The programs are either consistent with generally accepted industry methods as discussed in NUREG-1801 (Reference A-18), require enhancements to be consistent with generally accepted industry standards, or are site-specific programs.

The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. The implementation status of the listed programs will change as new programs are developed and enhancements to existing programs are completed. Commitments for program additions and enhancements are identified in the appropriate sections.

1. Battery Rack Inspections [Section A2.1.1] [Existing - Requires Enhancement]
2. Boraflex Monitoring [Section A2.1.2] [Existing]
3. Boric Acid Corrosion [Section A2.1.3] [Existing]

4. Buried Pipe Inspection Program [Section A2.1.4] [Existing - Requires Enhancement]
5. Chemistry Control for Primary Systems Program [Section A2.1.5] [Existing]
6. Chemistry Control for Secondary Systems Program [Section A2.1.6] [Existing]
7. Closed-Cycle Cooling Water System [Section A2.1.7] [Existing]
8. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section A2.1.8] [To Be Developed]
9. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits [Section A2.1.9] [Existing - Requires Enhancement]
10. Fire Protection Program [Section A2.1.10] [Existing - Requires Enhancement]
11. Flow-Accelerated Corrosion [Section A2.1.11] [Existing]
12. Fuel Oil Chemistry [Section A2.1.12] [Existing]
13. General Condition Monitoring [Section A2.1.13] [Existing - Requires Enhancement]
14. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section A2.1.14] [Existing - Requires Enhancement]
15. Infrequently Accessed Areas Inspection Program [Section A2.1.15] [To Be Developed]
16. Inservice Inspection Program: Containment Inspections [Section A2.1.16] [Existing]
17. Inservice Inspection Program: Reactor Vessel Internals [Section A2.1.17] [Existing]
18. Inservice Inspection Program: Systems, Components and Supports [Section A2.1.18] [Existing]
19. Inspection Activities: Load Handling Cranes and Devices [Section A2.1.19] [Existing - Requires Enhancement]
20. Reactor Vessel Surveillance [Section A2.1.20] [Existing]
21. Service Water System (Open-Cycle Cooling) [Section A2.1.21] [Existing]
22. Steam Generator Structural Integrity [Section A2.1.22] [Existing]
23. Structures Monitoring Program [Section A2.1.23] [Existing - Requires Enhancement]
24. Tank Inspection Program [Section A2.1.24] [Existing - Requires Enhancement]
25. Work Control Process [Section A2.1.25] [Existing - Requires Enhancement]

A1.2 TIME LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS:

1. Electrical Equipment Qualification [Section A4.1] [Existing]

2. Metal Fatigue of Reactor Coolant Pressure Boundary [Section A4.2] [Existing]

A2.0 PROGRAMS THAT MANAGE THE EFFECTS OF AGING

This section provides summaries of the programs credited for managing the effects of aging.

The Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in NUREG-1800, Section A.2. The Quality Assurance program includes the elements of corrective action, confirmation process, and administrative controls and is applicable to the safety-related and non-safety-related systems, structures, and components that are within the scope of license renewal.

A2.1 AGING MANAGEMENT PROGRAMS

A2.1.1 BATTERY RACK INSPECTIONS

Program Description

Battery Rack Inspections is a plant-specific program that manages the aging effect of loss of material. The structural integrity of the support racks for the station batteries, within the scope of license renewal, is verified by visually inspecting for loss of material.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Inclusion of In-Scope Battery Racks

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 1.

- Inspection Criteria

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 2.

A2.1.2 BORAFLEX MONITORING

Program Description

Boraflex Monitoring program corresponds to NUREG-1801, Section XI. M22, “Boraflex Monitoring.” *Boraflex Monitoring* manages the aging effect of change of material properties and ensures that periodic testing and monitoring is performed to verify the condition of the neutron-absorbing panels in the spent fuel storage pool. This program manages the effects of aging on sheets of neutron-absorbing materials affixed inside the spent fuel racks.

Samples of the Boraflex material are tested for Boron-10 areal density, and physical measurements are taken and analyzed. The analysis must conclude that the loss of B-10 density is less than that assumed in the criticality analysis. For blackness testing, procedures require that if any single gap in a Boraflex panel exceeds a specified limit specific notifications occur and a condition report be initiated. 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.

A2.1.3 BORIC ACID CORROSION

Program Description

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 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.

A2.1.4 BURIED PIPE INSPECTION PROGRAM

Program Description

The *Buried Pipe Inspection Program* is an existing program that corresponds to NUREG-1801, Sections XI.M28, “Buried Piping and Tanks Surveillance” and XI.M34, “Buried Piping and Tanks Inspection.” The program manages the aging effect of loss of material through the use of preventive measures and inspections.The inspections will be performed when the piping and components are excavated for maintenance or for any other reason.

There are no buried tanks within the scope of license renewal.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Baseline Inspection

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 3.

- Buried Piping Inspections

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 4.

A2.1.5 CHEMISTRY CONTROL FOR PRIMARY SYSTEMS PROGRAM

Program Description

Chemistry Control for Primary Systems Program corresponds to NUREG-1801, Section XI.M2, “Water Chemistry.” The program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking.

Water chemistry control is in accordance with the guidelines in EPRI TR-105714 (Reference A-1) for primary water chemistry.

The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system-specific limits. 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.

A2.1.6 CHEMISTRY CONTROL FOR SECONDARY SYSTEMS PROGRAM

Program Description

Chemistry Control for Secondary Systems Program corresponds to NUREG-1801, Section XI.M2, “Water Chemistry.” The 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. Water chemistry control is in accordance with the guidelines in EPRI TR-102134 (Reference A-2) for secondary water chemistry.

The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system-specific limits. 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.

A2.1.7 CLOSED-CYCLE COOLING WATER SYSTEM

Program Description

Closed-Cycle Cooling Water System corresponds to NUREG-1801, Section XI. M21, “Closed-Cycle Cooling Water System.” The program manages the aging effect of loss of material through the maintenance of process fluid chemistry and performance monitoring of closed-cycle cooling water systems to ensure parameters remain within acceptable limits. The program is based directly on guidance contained in EPRI Report TR-107396 (Reference A-15).

The acceptance criterion is that the maximum levels for the monitored contaminants are maintained below the system specific limits. 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.

A2.1.8 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements corresponds to NUREG-1801, Section XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements" as modified by NRC Interim Staff Guidance-05 (Reference A-24). This program manages the aging effects of cracking and embrittlement to ensure that electrical cables, connectors, and fuse holders within the scope of license renewal that are exposed to an adverse localized environment (but not subject to the environmental qualification requirements of 10 CFR 50.49) are capable of performing their intended function. Adverse localized environments may be caused by heat, radiation or moisture.

The acceptance criterion for the visual inspections of accessible non-EQ cable jackets and connector coverings 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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following actions will be implemented prior to the period of extended operation:

- Program Implementation

  The *Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program will be established.

  This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 5.

- Inclusion of In-Scope Fuse Holders

  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 *Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* (if needed for fuse holders) will consider the aging stressors for the metallic clips.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 6.

A2.1.9 ELECTRICAL CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS

Program Description

Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits corresponds to NUREG-1801, Section XI.E2, "Electrical Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits" and the program as modified in draft NRC ISG-15 (Reference A-29). This program manages the aging effects of cracking and embrittlement for electrical cables within the scope of license renewal that are used in circuits with sensitive, low-level signals, such as radiation monitoring and nuclear instrumentation (but not subject to the environmental qualification requirements of 10 CFR 50.49), and are installed in adverse localized environments caused by heat, radiation or moisture.

The acceptance criterion for the calibration readings is the loop-specific tolerances established in Technical Specifications and surveillance procedures. Where calibration of the instrumentation is not performed in-situ, the acceptance criteria for each test are defined by the specific type of test performed and the specific cable tested. 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.

Commitments

The following program enhancement will be implemented prior to the period of extended operation:

- Testing of Cables for Instruments That Are Not Calibrated In Situ

  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. The first tests will be completed prior to the period of extended operation. The frequency of subsequent tests will be based on Engineering evaluation and will not exceed a 10 year interval. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 7.

A2.1.10 FIRE PROTECTION PROGRAM

Program Description

The *Fire Protection Program* is an existing program and corresponds to NUREG-1801, Sections XI.M26, “Fire Protection” and XI.M27, “Fire Water System” and to the revised XI.M27, “Fire Water System” program described in NRC Interim Staff Guidance (ISG)-04 (Reference A-14). The 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 program also manages the aging effects for the diesel-driven fire pump fuel supply line, the reactor coolant pump oil collection systems, and Appendix R support equipment.

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 opened for maintenance or repair.

The acceptance criteria for the *Fire Protection Program are:*

- For visual inspections, the absence of anomalous indications that are signs of degradation.
- For fire barriers and fire doors, the sizes for breaks, holes, cracks, spalling gaps, and/or clearances are in accordance with the limits established in the inspection procedures.
- For fire protection equipment performance tests (i.e., flow and pressure tests), acceptance criteria are provided in the appropriate surveillance procedures.

Additionally, the fire protection water system pressure is continuously monitored to be above the minimum setpoint. 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.

Commitments

The following program enhancement will be implemented prior to the period of extended operation:

- Baseline Fire Protection Inspections

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 8.

The following program enhancement will be implemented prior to the sprinkler heads achieving 50 years of service life:

- Testing or Replacement of Sprinkler Heads

  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 is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 9.

A2.1.11 FLOW-ACCELERATED CORROSION

Program Description

Flow-Accelerated Corrosion Program corresponds to NUREG-1801, Section XI.M17, "Flow-Accelerated Corrosion." The program manages the aging effect of loss of material in accordance with the EPRI guidelines in NSAC-202L (Reference A-4). It includes procedures or administrative controls to assure that the structural integrity of carbon steel and low-alloy steel piping and components, such as valves, steam traps, and feedwater heaters, is maintained.

The 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.

A2.1.12 FUEL OIL CHEMISTRY

Program Description

Fuel Oil Chemistry corresponds to NUREG-1801, Section XI.M30, "Fuel Oil Chemistry." The program manages 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.

The acceptance criterion is adherence to the specific guidelines and limits defined in related plant procedures for parameters that have been shown to contribute to component 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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

A2.1.13 GENERAL CONDITION MONITORING

Program Description

General Condition Monitoring is a plant-specific program that 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. *General Condition Monitoring* is implemented by Health Physics technicians, System Engineers, and Plant Equipment Operators while performing their routine in-plant activities.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancement will be implemented prior to the period of extended operation:

- Procedure and Training Enhancements

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 10.

A2.1.14 INACCESSIBLE MEDIUM VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements corresponds to NUREG-1801, Section XI.E3, “Inaccessible Medium-Voltage Cables not Subject to 10 CFR50.49 Environmental Qualification Requirements.” This program manages the aging effect of formation of water trees and ensures that inaccessible medium-voltage (2 kV to 15 kV) electrical cables within the scope of license renewal (but not subject to the environmental qualification requirements of 10 CFR 50.49) that have been submerged, remain capable of performing their intended function. The program considers the combined effects of submergence, simultaneous with a significant voltage exposure. Significant voltage exposure is defined as being subjected to system voltage for more the twenty-five percent of the time.

The acceptance criterion for the visual inspections is that in-scope, medium-voltage cables have not been submerged. The acceptance criterion for testing, if determined to be necessary based on an engineering evaluation, will be defined in accordance with the specific type of test identified. 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.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Verification Testing

  Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that are exposed to significant voltage and have been submerged. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. 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.

  This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 11.

A2.1.15 INFREQUENTLY ACCESSED AREAS INSPECTION PROGRAM

Program Description

Infrequently Accessed Areas Inspection Program is a plant-specific program that manages the aging effects of loss of material, change of material properties, and cracking. The program uses visual inspections of the external surfaces of in-scope structures and components located in infrequently accessed areas of the plant.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Program Implementation

  The *Infrequently Accessed Areas Inspection Program* will be established.

  This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 12.

A2.1.16 INSERVICE INSPECTION PROGRAM: CONTAINMENT INSPECTIONS

Program Description

Inservice Inspection Program: Containment Inspections corresponds to the following NUREG-1801 program descriptions:

- Section XI.S1, “ASME Section XI, Subsection IWE”,
- Section XI.S2, “ASME Section XI, Subsection IWL”, and
- Section XI.S4, “10 CFR Part 50, Appendix J.”

The program manages the aging effects of loss of material, change of material properties, and cracking. The program is consistent with ASME Section XI, Subsections IWE and IWL, and 10 CFR 50.55a(b)(2), which provide the criteria for ISI Containment inspections.

Appendix J Leakage Rate Testing is included as part of the *Inservice Inspection Program: Containment Inspections*. The Containment Appendix J Leakage Rate Test Program implements Type A tests to measure the overall primary Containment integrated leakage rate.

The acceptance criteria for examinations performed in accordance with the *Inservice Inspection Program: Containment Inspections* are based on the applicable regulations and standards. 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.

A2.1.17 INSERVICE INSPECTION PROGRAM: REACTOR VESSEL INTERNALS

Program Description

Inservice Inspection Program: Reactor Vessel Internals corresponds to the following NUREG-1801 program descriptions:

- Section XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”.
- Section XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”.
- Section XI.M16, “PWR Vessel Internals”.

The *Inservice Inspection Program: Reactor Vessel Internals* manages the effects of aging for those reactor internals that are susceptible to loss of material, cracking, loss of pre-load, change in dimension and loss of fracture toughness (which presents itself as cracking due to embrittlement).

Industry groups are in place whose objectives include the investigation of the aging effects applicable to reactor vessel internals regarding such items 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.

The acceptance criteria for examinations performed in accordance with the *Inservice Inspection Program: Reactor Vessel Internals* are based on the applicable regulations and acceptance standards. 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.

Commitments

The following action will be implemented prior to period of extended operation:

- Maintaining Cognizance of Industry Developments of Reactor Vessel Internals Inspections

  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), and stress corrosion cracking (PWSCC and IASCC) and will implement the appropriate recommendations resulting from this guidance.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 13.

A2.1.18 INSERVICE INSPECTION PROGRAM: SYSTEMS, COMPONENTS AND SUPPORTS

Program Description

Inservice Inspection Program: Systems, Components and Supports corresponds to the following NUREG-1801 program descriptions:

- Section XI.M1, "ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD",
- Section XI.M3, "Reactor Head Closure Studs",
- Section XI.M11, "Ni-Alloy Nozzles and Penetrations",
- Section XI.M12, "Thermal Aging Embrittlement of Cast Austentic Stainless Steel (CASS)", and
- Section XI.S3, "ASME Section XI, Subsection IWF."

The *Inservice Inspection Program: Systems, Components and Supports* is an existing program that was developed to comply with the requirements of ASME Boiler and Pressure Vessel Code, Section XI (Reference A-6). The ASME program provides the requirements for ISI, repair, and replacement for 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 only Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the aging management review process) and for Class 1, 2, and 3 components supports. *Inservice Inspection Program: Systems, Components and Supports* manages the aging effects of cracking, loss of fracture toughness, loss of material, and loss of pre-load.

Industry programs are in place whose objectives include the investigation of aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identification of appropriate aging management activities.

The acceptance criteria for examinations performed in accordance with the *Inservice Inspection Program: Systems, Components and Supports* are based on the applicable regulations and acceptance standards. 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.

Commitments

The following action will be taken prior to the period of extended operation:

- PWSCC of Nickel-Based Alloys

  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, Table A6.0-1 License Renewal Commitments, Item 14.

A2.1.19 INSPECTION ACTIVITIES: LOAD HANDLING CRANES AND DEVICES

Program Description

Inspection Activities: Load Handling Cranes and Devices corresponds to NUREG-1801, Section XI. M23, "Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems." The 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.

Inspection Activities: Load Handling Cranes and Devices addresses 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 baseplates and anchorages for the runways and monorails.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Inclusion of In-Scope Lifting Devices

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 15.

- Inspection Criteria

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 16.

A2.1.20 REACTOR VESSEL SURVEILLANCE

Program Description

Reactor Vessel Surveillance corresponds to NUREG-1801, Section XI.M31 “Reactor Vessel Surveillance”. The *Reactor Vessel Surveillance* program manages the aging effect of loss of fracture toughness due to neutron embrittlement of the low-alloy subcomponents in the beltline region of the reactor vessel. Neutron dosimetry and material properties data derived from the reactor vessel materials’ irradiation surveillance program are used in calculations and evaluations that demonstrate compliance with applicable regulations. This program ensures compliance with Technical Requirements Manual requirements that surveillance specimens are removed and examined at predetermined intervals established in the Technical Specification to monitor the changes in the material properties and the results of the examinations used to update the Technical Specification operating limits.

The acceptance criteria are established in the current licensing basis as compliance with the applicable regulations and standards. 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.

A2.1.21 SERVICE WATER SYSTEM (OPEN-CYCLE COOLING)

Program Description

The *Service Water System (Open-Cycle Cooling)* program corresponds to NUREG-1801, Section XI.M20, “Open Cycle Cooling Water System.” The program manages the aging effects of loss of material and buildup of deposits. The program implements the NRC guidelines in Generic Letter 89-13 (Reference A-5), which includes

(a) surveillance and control of biofouling; (b) regular inspection and cleaning of heat exchangers (in lieu of thermal performance testing); (c) routine inspection and a maintenance program to ensure that corrosion (including microbiologically influenced corrosion), erosion, protective coating failure, silting, and biofouling do not degrade the performance of safety-related systems serviced by Service Water System; (d) a system walkdown inspection to ensure compliance with the licensing basis; and (e) a review of maintenance, operating, and training practices and procedures.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

A2.1.22 STEAM GENERATOR STRUCTURAL INTEGRITY

Program Description

Steam Generator Structural Integrity corresponds to NUREG-1801, Section XI.M19, “Steam Generator Tube Integrity Program.” This program manages the aging effects of loss of material and cracking and adopts the performance criteria and guidance for monitoring and maintaining steam generator tubes as defined in NEI 97-06 (Reference A-25). The program incorporates performance criteria for structural integrity, accident-induced leakage, and operational leakage. The program includes preventive measures to mitigate degradation through the control of primary and secondary side water chemistry; assessment of degradation mechanisms; inservice inspection of the steam generator tubes to detect degradation; evaluation and plugging or repair, as needed; and leakage monitoring to ensure the structural and leakage integrity of the pressure boundary.

Industry programs are in place whose objectives include the investigation of aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identification of appropriate aging management activities.

The acceptance criteria are established in the current licensing basis as compliance with the applicable regulations and acceptance standards. 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.

Commitments

The following action will be implemented based on the availability of the industry guidance:

- PWSCC of Nickel-Based Alloys

  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, Table A6.0-1 License Renewal Commitments, Item 14.

A2.1.23 STRUCTURES MONITORING PROGRAM

Program Description

Structures Monitoring Program corresponds to the following NUREG-1801 program descriptions:

- Section XI. S5 “Masonry Wall Program”,
- Section XI. S6 “Structures Monitoring Program”, and
- Section XI.S7 “R.G. 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants”.

The *Structures Monitoring Program* manages the aging effects of loss of material, change of material properties, and cracking by the monitoring of structures and structural support systems that are in the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 (Reference A-7). Other structures in the scope of license renewal (such as non-safety related buildings and enclosures, duct banks, valve pits and trenches, HELB barriers, and flood gates) are also monitored to ensure there is no loss of intended function.

The scope includes all masonry walls and water-control structures identified as performing intended functions in accordance with 10 CFR 54.4.

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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Modification of *Structures Monitoring Program* procedures

  NUREG-1801 recommends the use of ACI 349.3R-96 and ANSI/ASCE 11-90, as a reference for recommendations for the development of an evaluation procedure for nuclear safety-related concrete structures and existing buildings. These documents were not used or referenced as a standard for establishing the *Structures Monitoring Program*. The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 17.

- Addition of Structures to the *Structures Monitoring Program*

  The *Structures Monitoring Program* does not currently monitor all structures in-scope for license renewal. The *Structures Monitoring Program* and implementing procedures will be modified to include all in-scope structures. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 18.

- Sampling of Groundwater

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 19.

- Engineering Notification of Submerged Medium Voltage Cables

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 20.

- Inspection of Normally Inaccessible Areas That Become Accessible

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 21.

A2.1.24 TANK INSPECTION PROGRAM

Program Description

Tank Inspection Program corresponds to NUREG-1801, Section XI.M29, “Aboveground Carbon Steel Tanks.” The 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 the 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 volumetric examination 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. 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.

Commitments

The following program enhancements will be implemented prior to the period of extended operation:

- Inspection of sealants and caulkings

  Appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be performed. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 22.

- Non-destructive Volumetric Examination of Inaccessible Tank Bottoms

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 23.

- Tanks Being Added to *Tank Inspection Program*

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 24.

A2.1.25 WORK CONTROL PROCESS

Program Description

Work Control Process is a plant specific program that integrates and coordinates the combined efforts of Maintenance, Engineering, Operations, and other support organizations to manage maintenance activities. The *Work Control Process* is utilized to manage 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. Performance testing and maintenance activities, both preventive and corrective, are planned and conducted in accordance with the *Work Control Process*. 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 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 corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

Commitments

The following program enhancement will be implemented prior to the period of extended operation:

- Performance of Inspections During Maintenance Activities

  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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 25.

A3.0 TIME-LIMITED AGING ANALYSIS

As part of the application for a renewed license, 10 CFR 54.21(c) requires that an evaluation of Time-limited Aging Analyses (TLAAs) for the period of extended operation be provided. The following TLAAs have been identified and evaluated to meet this requirement.

A3.1 REACTOR VESSEL NEUTRON EMBRITTLEMENT

The reactor vessel is described in FSAR Section 4.3.1. Time-limited aging analyses (TLAAs) applicable to the reactor vessel are:

- Pressurized thermal shock
- Upper-shelf energy
- Pressure-temperature limits

The Reactor Vessel Surveillance program manages reactor vessel irradiation embrittlement utilizing subprograms to monitor, calculate, and evaluate the time-dependent parameters used in the aging analyses for pressurized thermal shock, upper-shelf energy, and pressure-temperature limit curves to ensure continuing vessel integrity through the period of extended operation.

The reactor vessel neutron embrittlement evaluations have been based on 54 effective full power years of operation. 54 effective full power years would be reached at the end of the period of extended operation (60 years) assuming a capacity factor of 90% for the lifetime of the unit.

A3.1.1 UPPER SHELF ENERGY

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.

A3.1.2 PRESSURIZED THERMAL SHOCK

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.

A3.1.3 PRESSURE-TEMPERATURE 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 vessel fluence.

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.

A3.2 METAL FATIGUE

Fatigue is defined as structural deterioration that can occur through repeated stress or strain cycles resulting from fluctuations in loads and/or temperatures. After repeated cyclic loading of sufficient magnitude, micro-structural damage can accumulate leading to microscopic crack initiation at the most highly affected locations. Fatigue cracks typically initiate at points of maximum local stress ranges and minimum local strength. Further cyclic mechanical and/or thermal loading can lead to crack growth.

Fatigue represents an aging mechanism. As such, fatigue evaluations represent a time-limited aging analysis even though the system, structure and component design limits are based upon the number of cycles and the associated fatigue (cumulative) usage factors rather than specific time limits.

A3.2.1 MILLSTONE UNIT 2 CLASS 1 COMPONENTS

Components within the Millstone Unit 2 nuclear steam supply system are subject to a wide variety of varying mechanical and thermal loads that contribute to fatigue accumulation. The Reactor Coolant System components are designed in accordance with ASME *Boiler and Pressure Vessel Code*, Section III (Reference A-8) and ANSI Standard B31.7 (Reference A-9). Use of these codes requires that design analyses for Class A (Class 1) systems and components address fatigue and the establishment of load limits to preclude initiation of fatigue cracks.

The type and number of Reactor Coolant System design transients have been identified. In all instances, the number of Reactor Coolant System design transients assumed in the original design were found to be acceptable for the period of extended operation.

NRC Bulletin 88-08 identified a concern regarding potential temperature stratification or temperature oscillations in unisolable sections of piping attached to the Reactor Coolant System. Based upon the Millstone Unit 2 response (Reference A-19) and supplemental communications, the NRC concluded that Millstone Unit 2 meets the requirements of Bulletin 88-08. (Reference A-20)

Pressurizer surge line thermal stratification was a concern raised by the NRC in Bulletin 88-11. One of the requirements of this bulletin was to analyze the effects of thermal stratification on surge line integrity. These analyses were collectively performed as a Combustion Engineering Owners Group task (Reference A-21) supplemented by additional unit specific inspections and activities. Based upon the Combustion Engineering Owners Group task, the NRC concluded that the owners group analysis CEN-387-P is bounding for thermal stratification and thermal striping (Reference A-22). Confirmation that this analysis is bounding for Millstone Unit 2 and confirmation that the actions required by Bulletin 88-11 have been completed was provided to the NRC (Reference A-23).

Acceptable thermal and pressure transients, and operating cycles have been projected for ASME Section III Class A, Class 1 and ANSI Standard B31.7 Class 1 components though the period of extended operation.

A3.2.2 NON-CLASS 1 COMPONENTS

Non-Class 1 components can include ASME Section III Classes 2 and 3, ANSI Standard B31.7 Classes 2 and 3, and ANSI Standard B31.1 (Reference A-10) piping and tubing.

Piping systems designed to these requirements (e.g., sample lines) incorporate a stress range reduction factor to conservatively address the effects of thermal cycling on fatigue. For those sample lines projected to experience greater than 7,000 thermal cycles, actual expansion stresses did not exceed allowable expansion stresses.

Acceptable numbers of thermal cycles and acceptable expansion stresses have been projected to the end of the period of extended operation

A3.2.3 ENVIRONMENTALLY ASSISTED FATIGUE

The effect of reactor coolant environment on fatigue is generally referred to as environmentally assisted fatigue. As part of an industry effort to address environmental effects on operating nuclear power plants during the current 40-year licensing term, Idaho National Engineering Laboratories evaluated fatigue-sensitive component locations at plants designed by all four domestic nuclear steam supply system vendors. These evaluations are presented and discussed in NUREG/CR-6260 (Reference A-26). The evaluations associated with the newer-vintage Combustion Engineering plants are applicable since the majority of the Millstone Unit 2 Class 1 systems and components were designed to ASME Section III/ANSI B31.7 requirements.

The influence of the reactor water environment on the cumulative usage factor was evaluated for the following representative components identified in NUREG/CR-6260 for the period of extended operation, using the most recent laboratory data and methods:

- Reactor vessel shell and lower head.
- Reactor vessel inlet and outlet nozzles.
- Surge line.
- Charging System nozzle.
- Safety Injection System nozzle.
- Shutdown cooling line.

These six fatigue-sensitive locations have been evaluated using the methods identified in NUREG/CR-6583 (Reference A-27), and NUREG/CR-5704 (Reference A-28).

Utilizing Millstone Unit 2 cyclic and transient information, all six fatigue sensitive component locations were determined to be acceptable for the period of extended operation.

A3.3 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC EQUIPMENT

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 provided in Appendix A, Section A4.1, Electrical Equipment Qualification.

10 CFR Part 50 requires that certain categories of systems, structures and components 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 of these categories of electrical equipment are embodied within 10 CFR 50.49 (Reference A-17). 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 are to be refurbished, replaced or have their 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 time-limited aging analysis. Guidance relating to the methods and procedures for implementing the requirements of 10 CFR 50.49 is contained within Regulatory Guide 1.89 (Reference A-11). Further guidance for post-accident monitoring equipment is contained within Regulatory Guide 1.97 (Reference A-12).

Environmental qualification of electrical equipment will be adequately managed for the period of extended operation.

A3.4 CONCRETE CONTAINMENT TENDON PRESTRESS

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 evaluation of containment tendon examination and surveillance test results involves 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 has been performed and indicate acceptable losses in Containment tendon prestress have been projected through the period of extended operation.

A3.5 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

A3.5.1 CONTAINMENT LINER PLATE

Millstone Unit 2 has a prestressed, post-tensioned concrete Containment surrounded by an enclosure building. A welded carbon steel liner plate is attached to the inside surface of the concrete. Both the liner plate and the penetration sleeves are designed to serve as the primary Containment leakage barrier. Components of the liner plate include penetration sleeves, access openings, piping penetrations, and electrical penetrations.

Evaluations of the Containment liner plate involve the use of time-limited assumptions such as corrosion rates and thermal cycles. These evaluations also meet the requirements of 10 CFR 54.3 and, as such, represent time-limited aging analyses. Acceptable Containment liner plate integrity has been projected to the end of the period of extended operation.

A3.5.2 CONTAINMENT PENETRATIONS

All Millstone Unit 2 Containment penetrations are pressure resistant, leak-tight, welded assemblies, fabricated, installed, inspected, and tested in accordance with ASME Nuclear Vessel Code, Section III (Reference A-8) and ANSI Nuclear Piping Code B31.7 (Reference A-9).

Evaluations of Containment liner plate components involve the use of time-limited assumptions such as corrosion rates and thermal cycles. These evaluations meet the requirements of 10 CFR 54.3 and, as such, represent time-limited aging analyses.

The Containment penetration analyses remain valid for the period of extended operation.

A3.6 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

A3.6.1 CRANE LOAD CYCLE LIMIT

The containment polar crane, spent fuel crane, and monorails are examples of the types of cranes within the scope of license renewal. These cranes meet the guidance contained in NUREG-0612.

The evaluation of crane loads represents a time-limited aging analysis per 10 CFR 54.3 since it involves the use of a time-limited assumption, load cycles. The most frequently used crane is the spent fuel crane. Considering all uses, the spent fuel crane is expected to conservatively experience a total of number of load cycles over a 60-year period, that is well below the number of cycles allowed in Crane Manufacturers Association of America, Inc. Specification No. 70.

Acceptable crane load cycles have been projected to the end of the period of extended operation.

A3.6.2 REACTOR COOLANT PUMP FLYWHEEL

The reactor coolant pump 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 reactor coolant pump 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.

An evaluation was performed of the likelihood of flywheel failure over a 60-year period of operation and a justification was developed for relaxation of RG 1.14, Revision 1, Regulatory Position C.4.b(1), requirements to those identified in Regulatory Position C.4.b(2)(Reference A-13). Using this evaluation, the NRC issued Amendment No. 264 to the unit Technical Specifications, consistent with RG 1.14, Revision 1, Regulatory Position C.4.b(2), to allow the examination of each reactor coolant pump flywheel at least once every 10-years, coinciding with the ASME Section XI inservice inspection program schedule.

The evaluation of 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. This evaluation, which indicates a low likelihood of flywheel fatigue failure over a 60-year period, along with implementation of the Inservice Inspection Program: Systems, Components and Supports, provides reasonable assurance that flywheel cracking will be adequately managed for the period of extended operation.

Reactor coolant pump flywheel fatigue cracking will be adequately managed for the period of extended operation.

A3.6.3 REACTOR COOLANT PUMP CODE CASE N-481

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 ten-year inspection period. These 10-year volumetric inspections are significant for a number of reasons, including; the reactor coolant pumps are welded to the piping, and the pumps must be disassembled in order to gain access to the inside surface of the cast austenitic 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, supplemented by specific visual inspections.

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. This evaluation, which indicates a low likelihood of casing fatigue failure over a 60-year period, along with implementation of the Inservice Inspection Program: Systems, Components and Supports, provides reasonable assurance that cracking of cast stainless steel reactor coolant pump casing welds will be adequately managed now and for the period of extended operation.

A3.6.4 LEAK-BEFORE-BREAK

The fundamental premise of Leak-Before-Break (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. Application of this methodology is limited to those high-energy fluid systems not considered to be overly susceptible to failure from such mechanisms as corrosion, water hammer, fatigue, thermal aging; or indirectly from such causes as missile damage or the failure of nearby components. Specifically, a LBB analysis needs to demonstrate that the probability of a pipe rupture is extremely low under design basis conditions, consistent with the high-energy fluid system.

Results of the ABB Combustion Engineering Owners Group evaluation, CEN-367-A, demonstrated that if a crack were to occur within the Millstone Unit 2 Reactor Coolant System piping (a Group 1 plant), the crack would be detectable, remain stable, and not result in a double-ended tube rupture, guillotine break, or unstable slot break. Based on NRC review of these evaluations and results, LBB behavior remains applicable for the Millstone Unit 2 reactor coolant loop piping over the current 40-year license period. Report CEN-367-A has been re-evaluated and found to also be applicable for the period of extended operation.

LBB evaluations and calculations represent a TLAA per 10 CFR 54.3 since they involve the use of time-limited assumptions (e.g., transient cycles, crack growth rates, cumulative or fatigue usage factors, thermal embrittlement) in determining the acceptability of critical systems, structures or components for continued service.

LBB evaluations remain valid for the period of extended operation.

A4.0 TLAA SUPPORT PROGRAMS

A4.1 ELECTRICAL EQUIPMENT QUALIFICATION

The *Electrical Equipment Qualification* program corresponds to the Time-Limited Aging Analysis (TLAA) support program described in NUREG-1801, Section X.E1, “Environmental Qualification (EQ) of Electrical Components.” The program applies to certain electrical components that are important to safety and could be exposed to post-accident environmental conditions, as defined in 10 CFR 50.49. The *EEQ* program ensures the continued qualification of this equipment during and following design basis accidents. The program determines the necessity for, and frequency of, component replacement or refurbishment in order to maintain the qualification of the equipment. Performance of preventive maintenance and surveillance activities, and monitoring of normal ambient conditions, ensure that components remain within the bounds of their original qualification and provide a basis for extending qualified life through re-analysis.

The acceptance criterion is that the equipment remains within the bounds of its qualified life such that after maximum normal service conditions, the equipment retains sufficient capacity to perform its required safety function during design basis accident conditions. 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.

A4.2 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

Program Description

The *Metal Fatigue of Reactor Coolant Pressure Boundary* program mitigates fatigue cracking caused by cyclic strains in metal components of the reactor coolant pressure boundary. This is accomplished by monitoring and tracking the number of critical thermal and pressure transients for selected Reactor Coolant System components to ensure that the number of design transient cycles is not exceeded during the plant operating life.

The acceptance criterion is the fatigue usage factors bounded by the design usage factors. 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.

A5.0 EXEMPTIONS

The requirements of 10 CFR 54.21(c) stipulate that the application for a renewed license should include a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and that are based on time-limited aging analyses, as defined in 10 CFR 54.3. Each active 10 CFR 50.12 exemption has been reviewed to determine whether the exemption is based on a time-limited aging analysis. No plant-specific exemptions granted pursuant to 10 CFR 50.12 and based on a time-limited aging analyses as defined in 10 CFR 54.3 have been identified.

A6.0 LICENSE RENEWAL COMMITMENTS

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
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.	Battery Rack Inspection	Prior to Period of Extended Operation
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.	Battery Rack Inspection	Prior to Period of Extended Operation
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.	Buried Pipe Inspection Program	Prior to Period of Extended Operation
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.	Buried Pipe Inspection Program	Prior to Period of Extended Operation
5	The *Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program will be established.	Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
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.	Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Prior to Period of Extended Operation
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.	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.
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.	Fire Protection Program	Prior to Period of Extended Operation
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*.	Fire Protection Program	Prior to The Sprinkler Heads Achieving 50 Years Of Service Life.
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.	General Condition Monitoring	Prior to Period of Extended Operation

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
11	Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that have significant voltage and have been submerged. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting. 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.	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)
12	The *Infrequently Accessed Areas Inspection Program* will be established.	Infrequently Accessed Areas Inspection Program	Prior to Period of Extended Operation
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), and stress corrosion cracking (PWSCC and IASCC) and will implement the appropriate recommendations resulting from this guidance.	ISI Program: Reactor Vessel Internals	Prior to Period of Extended Operation

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
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.	Inservice Inspection Program: Systems, Components and Supports Steam Generator Structural Integrity	Prior to the Period of Extended Operation
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.	Inspection Activities: Load Handling Cranes and Devices Program	Prior to Period of Extended Operation
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.	Inspection Activities: Load Handling Cranes and Devices Program	Prior to Period of Extended Operation
17	The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program.	Structures Monitoring Program	Prior to Period of Extended Operation
18	The *Structures Monitoring Program* and implementing procedures will be modified to include all in-scope structures.	Structures Monitoring Program	Prior to Period of Extended Operation

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
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.	Structures Monitoring Program	Prior to Period of Extended Operation
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.	Structures Monitoring Program	Prior to Period of Extended Operation
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.	Structures Monitoring Program	Prior to Period of Extended Operation
22	Appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be performed.	Tank Inspection Program	Prior to Period of Extended Operation.
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.	Tank Inspection Program	Prior to Period of Extended Operation A frequency consistent with scheduled tank internals inspection activities.

Table A6.0-1 License Renewal Commitments

Item	Commitment	Source	Schedule[a]
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.	Tank Inspection Program	Prior to Period of Extended Operation
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.	Work Control Process	Prior to Period of Extended Operation
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 - SAMA Analysis	Prior to Period of Extended Operation

a. The Period of Extended operation is the period of 20 years beyond the expiration date of the unit’s current operating license.

APPENDIX A REFERENCES

A-1 TR-105714, *PWR Primary Water Chemistry Guidelines*, Technical Report, Revision 3, Electric Power Research Institute.

A-2 TR-102134, *PWR Secondary Water Chemistry Guidelines*, Technical Report, Revision 3, Electrical Power Research Institute.

A-3 Code Case N-481, Alternate Examination Requirements for Cast Austenitic Pump Casings, ASME Section XI, American Society of Mechanical Engineers, New York.

A-4 NSAC-202L, *Recommendation for an Effective Flow Accelerated Corrosion Program*, Electric Power Research Institute, April 8, 1999.

A-5 Generic Letter 89-13, *Service Water System Problems Affecting Safety-Related Equipment*, Nuclear Regulatory Commission, July 18, 1989 (Supplement 1 dated 4/4/90).

A-6 ASME Boiler and Pressure Vessel Code Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, American Society of Mechanical Engineers

A-7 10 CFR 50.65, *Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, U. S. Nuclear Regulatory Commission

A-8 ASME Section III, "*Rules for Construction of Nuclear Vessels*", ASME Boiler and Vessel Pressure Code, American Society of Mechanical Engineers, 1971I

A-9 ANSI Standard B31.7, *Nuclear Power Piping Code*, American Society of Mechanical Engineers,

A-10 ANSI B31.1, *Power Piping Code*, American Society of Mechanical Engineers, 1967.

A-11 Regulatory Guide 1.89, E*nvironmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants,* U. S. Nuclear Regulatory Commission.

A-12 Regulatory Guide 1.97, *Instrumentation of Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident,* U. S. Nuclear Regulatory Commission.

A-13 SIR-94-080-A, *Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements*, Structural Integrity Associates, Inc., September 1997.

A-14 NRC Interim Staff Guidance (ISG)-04, *"Aging Management of Fire Protection Systems for License Renewal"*, U.S. Nuclear Regulatory Commission, December 3, 2002.

A-15 EPRI TR-107396, *Closed Cooling Water Chemistry Guidelin*e, Technical Report, Electrical Power Research Institute, Palo Alto, CA, November 1997.

A-16 NUREG/CR-6260, *Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components*, U.S. Nuclear Regulatory Commission, March 1995.

A-17 10 CFR 50.49, *Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants,* U. S. Nuclear Regulatory Commission.

A-18 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, U. S. Nuclear Regulatory Commission, July 2001

A-19 Letter from E. J. Mroczka to NRC, *Response to NRC Bulletin No. 88-08, Thermal Stresses in Piping Connected to Reactor Coolant System*, September 20, 1988.

A-20 Letter from G.S. Vissing to E. J. Mroczka, *NRC Bulletin 88-08, Thermal Stresses in Piping Connected to Reactor Coolant Systems (TAC 69652)*, September 30, 1991

A-21 Letter from E. J. Mroczka to NRC, *NRC Bulletin No. 88-11, Pressurizer Surge Line Thermal Stratification*, February 28, 1989

A-22 Letter from G. S. Vissing to J. F. Opeka, *Safety Evaluation for Combustion Engineering Owners Group Report CEN-387-P, Revision 1 - Pressurizer Surge Line Thermal Stratification Evaluation (Bulletin 88-11)(TAC No. M72144)*, July 6, 1993

A-23 Letter from J. F. Opeka to NRC, *Response to NRC Staff Request for Additional Information on Pressurizer Surge Line Thermal Stratification Evaluation*, September 30, 1993

A-24 NRC Interim Staff Guidance (ISG)-05*, The Identification And Treatment Of Electrical Fuse Holders For License Renewal*, U.S. Nuclear Regulatory Commission, March 10, 2003

A-25 NEI 97-06, *Steam Generator Program Guidelines*, Revision 1, Technical Report, Nuclear Energy Institute.

A-26 NUREG/CR-6260, *Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,* U.S. Nuclear Regulatory Commission.

A-27 NUREG/CR-6583, *Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels*, U.S. Nuclear Regulatory Commission.

A-28 NUREG/CR-5704, *Effects of LWR Coolant Environment on Fatigue Design Curves of Austenitic Stainless Steel*, U.S. Nuclear Regulatory Commission.

A-29 Letter from Pao-Tsin Kuo, Nuclear Regulatory Commission, to Alex Marion, Nuclear Energy Institute, and David Lochbaum, Union of Concerned Scientists, *Proposed Interim Staff Guidance (ISG)-15: Revision of Generic Aging Lessons Learned (GALL) Aging Management Program (AMP) X1.E2, "Electrical Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"*, August 12, 2003.

APPENDIX B AGING MANAGEMENT PROGRAMS

Contents

B1.0 INTRODUCTION

B1.1 OVERVIEW

License renewal aging management program descriptions are provided in this appendix for each program credited for managing aging effects based upon the aging management review results provided in Sections 3.1 through 3.6 of this application.

Each of the aging management programs described in this section has ten elements which are consistent with the definitions described in Section A.1, “Aging Management Review - Generic,” Table A.1-1, “Elements of an Aging Management Program for License Renewal,” of NUREG 1800 (Reference B-1). The ten element detail is not provided when the program is deemed to be consistent with the assumptions made in NUREG-1801 (Reference B-10).

The 10 element detail is only provided when the program is plant-specific.

B1.2 METHOD OF DISCUSSION

For those aging management programs that are consistent with the assumptions made in Sections X and XI of NUREG-1801, or are consistent with exceptions, each program discussion is presented in the following format:

- A Program Description abstract of the overall program form and function is provided.
- A NUREG-1801 Consistency statement is made about the program.
- Exceptions to the NUREG-1801 program are outlined and a justification is provided.
- Enhancements to ensure consistency with NUREG-1801 or additions to the NUREG-1801 program to manage aging for additional components with aging effects not assumed in NUREG-1801 for the NUREG-1801 program is provided. A proposed schedule for completion is discussed.
- Operating Experience information specific to the program is provided.
- A Conclusion section provides a statement of reasonable assurance that the program is effective, or will be effective, once enhanced.

For those programs that are plant specific, the above form is generally followed with the additional discussion of each of the ten elements.

The AMP discussions are applicable to both Millstone Unit 2 and Unit 3 since the programs are implemented on a site-basis, rather than a unit-basis. Where AMP program description, exceptions, or enhancements are applicable to only one unit this has been identified by the use of a parenthetical marker, such as “(Millstone Unit 3 Only).”

B1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in Appendix A.2 of NUREG-1800 (Reference B-1). The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and is applicable to the safety-related and non-safety-related systems, structures, and components that are subject to aging management review. 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:

Corrective Actions:

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 in response 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 aging management program 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.

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 aging management program required for license renewal would also uncover any unsatisfactory condition due to ineffective corrective action.

Since the same 10 CFR 50, Appendix B corrective actions and confirmation process is applied for nonconforming SR and NSR structures and components subject to Aging Management Review (AMR) for license renewal, the corrective action program is consistent with the NUREG-1801 elements.

Administrative Controls:

Administrative controls 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.

B1.4 OPERATING EXPERIENCE

Industry operating experience was incorporated into the license renewal process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of systems and structures within the scope of license renewal. Review of plant specific operating experience was performed to identify aging effects experienced. The review of plant specific operating experience involved electronic database searches of plant information. In addition, discussions with system engineers and long time company employees were conducted.

Operating experience of the program, including past corrective actions resulting in program enhancements, was considered. This information provides objective evidence that the effects of aging have been, and will continue to be, adequately managed.

B1.5 AGING MANAGEMENT PROGRAMS

The following aging management programs are described in the sections listed in this appendix. The programs are either generic in nature as discussed in NUREG -1801 or are plant-specific. Plant-specific programs are listed near the end of the table in Section B2.0. All generic programs are fully consistent with or are, with some exceptions, consistent with programs discussed in NUREG-1801.

1. Battery Rack Inspections [Section B2.1.1] [Existing]
2. Boraflex Monitoring [Section B2.1.2] [Existing]
3. Boric Acid Corrosion [Section B2.1.3] [Existing]
4. Buried Pipe Inspection Program [Section B2.1.4] [Existing]
5. Chemistry Control for Primary Systems Program [Section B2.1.5] [Existing]
6. Chemistry Control for Secondary Systems Program [Section B2.1.6] [Existing]
7. Closed-Cycle Cooling Water System [Section B2.1.7] [Existing]

8. Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section B2.1.8] [New]
9. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits [Section B2.1.9] [Existing]
10. Fire Protection Program [Section B2.1.10] [Existing]
11. Flow-Accelerated Corrosion [Section B2.1.11] [Existing]
12. Fuel Oil Chemistry [Section B2.1.12] [Existing]
13. General Condition Monitoring [Section B2.1.13] [Existing]
14. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section B2.1.14] [Existing]
15. Infrequently Accessed Areas Inspection Program [Section B2.1.15] [New]
16. Inservice Inspection Program: Containment Inspections [Section B2.1.16] [Existing]
17. Inservice Inspection Program: Reactor Vessel Internals [Section B2.1.17] [Existing]
18. Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18] [Existing]
19. Inspection Activities: Load Handling Cranes and Devices [Section B2.1.19] [Existing]
20. Reactor Vessel Surveillance [Section B2.1.20] [Existing]
21. Service Water System (Open-Cycle Cooling) [Section B2.1.21] [Existing]
22. Steam Generator Structural Integrity [Section B2.1.22] [Existing]
23. Structures Monitoring Program [Section B2.1.23] [Existing]
24. Tank Inspection Program [Section B2.1.24] [Existing]
25. Work Control Process [Section B2.1.25] [Existing]

B1.6 TIME LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS:

1. Electrical Equipment Qualification [Section B3.1] [Existing]
2. Metal Fatigue of Reactor Coolant Pressure Boundary [Section B3.2] [Existing]

B2.0 AGING MANAGEMENT PROGRAM

The correlation between the NUREG-1801 (Generic Aging Lessons Learned (GALL)) programs and the Millstone Aging Management Programs are shown below. Links to the sections describing the Millstone programs are provided.

GALL ID Number	GALL Aging Management Program	Millstone Aging Management Program
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, & IWD	Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18]
XI.M2	Water Chemistry	Chemistry Control for Primary Systems Program [Section B2.1.5] Chemistry Control for Secondary Systems Program [Section B2.1.6]
XI.M3	Reactor Head Closure Studs	Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18]
XI.M4	BWR Vessel ID Attachment Welds	Millstone Unit 2 and 3 are PWRs.
XI.M5	BWR Feedwater Nozzle	Millstone Unit 2 and 3 are PWRs.
XI.M6	BWR Control Rod Drive Return Line Nozzle	Millstone Unit 2 and 3 are PWRs.
XI.M7	BWR Stress Corrosion Cracking	Millstone Unit 2 and 3 are PWRs.
XI.M8	BWR Penetrations	Millstone Unit 2 and 3 are PWRs.
XI.M9	BWR Vessel Internals	Millstone Unit 2 and 3 are PWRs.
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion [Section B2.1.3] General Condition Monitoring [Section B2.1.13]
XI.M11	Nickel-Alloy Nozzles and Penetrations	Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18]
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18] Inservice Inspection Program: Reactor Vessel Internals [Section B2.1.17]

GALL ID Number	GALL Aging Management Program	Millstone Aging Management Program
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Inservice Inspection Program: Reactor Vessel Internals [Section B2.1.17]
XI.M14	Loose Part Monitoring	The aging management reviews did not identify the need for this aging management program.
XI.M15	Neutron Noise Monitoring	The aging management reviews did not identify the need for this aging management program.
XI.M16	PWR Vessel Internals	Inservice Inspection Program: Reactor Vessel Internals [Section B2.1.17]
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion [Section B2.1.11]
XI.M18	Bolting Integrity	The aging management reviews did not identify the need for this aging management program.
XI.M19	Steam Generator Tube Integrity	Steam Generator Structural Integrity [Section B2.1.22]
XI.M20	Open-Cycle Cooling Water System	Service Water System (Open-Cycle Cooling) [Section B2.1.21]
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System [Section B2.1.7]
XI.M22	Boraflex Monitoring	Boraflex Monitoring [Section B2.1.2]
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Inspection Activities: Load Handling Cranes and Devices [Section B2.1.19]
XI.M24	Compressed Air Monitoring	The aging management reviews did not identify the need for this aging management program.
XI.M25	BWR Reactor Water Cleanup System	Millstone Unit 2 and 3 are PWRs
XI.M26	Fire Protection	Fire Protection Program [Section B2.1.10]
XI.M27	Fire Water System	Fire Protection Program [Section B2.1.10]
XI.M28	Buried Piping and Tanks Surveillance	Buried Pipe Inspection Program [Section B2.1.4]

GALL ID Number	GALL Aging Management Program	Millstone Aging Management Program
XI.M29	Aboveground Carbon Steel Tanks	Tank Inspection Program [Section B2.1.24]
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry [Section B2.1.12]
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance [Section B2.1.20]
XI.M32	One-Time Inspection	The aging management reviews did not identify the need for this aging management program.
XI.M33	Selective Leaching of Materials	The aging management reviews did not identify the need for this aging management program.
XI.M34	Buried Piping and Tanks Inspection	Buried Pipe Inspection Program [Section B2.1.4]
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section B2.1.8]
XI.E2	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits [Section B2.1.9]
XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements [Section B2.1.14]
XI.S1	ASME Section XI, Subsection IWE	Inservice Inspection Program: Containment Inspections [Section B2.1.16]
XI.S2	ASME Section XI, Subsection IWL	Inservice Inspection Program: Containment Inspections [Section B2.1.16]
XI.S3	ASME Section XI, Subsection IWF	Inservice Inspection Program: Systems, Components and Supports [Section B2.1.18]
XI.S4	10 CFR 50, Appendix J	Inservice Inspection Program: Containment Inspections [Section B2.1.16]

GALL ID Number	GALL Aging Management Program	Millstone Aging Management Program
XI.S5	Masonry Wall Program	Structures Monitoring Program [Section B2.1.23]
XI.S6	Structures Monitoring Program	Structures Monitoring Program [Section B2.1.23]
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Structures Monitoring Program [Section B2.1.23]
XI.S8	Protective Coating Monitoring and Maintenance	The aging management reviews performed for Millstone Unit 2 did not identify the need for this aging management program.
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Metal Fatigue of Reactor Coolant Pressure Boundary [Section B3.2]
X.E1	Environmental Qualification (EQ) of Electrical Components	Electrical Equipment Qualification [Section B3.1]
X.S1	Concrete Containment Tendon Prestress	Inservice Inspection Program: Containment Inspections [Section B2.1.16]
NA	Plant-specific	Infrequently Accessed Areas Inspection Program [Section B2.1.15]
NA	Plant-specific	General Condition Monitoring [Section B2.1.13]
NA	Plant-specific	Work Control Process [Section B2.1.25]
NA	Plant-specific	Battery Rack Inspections [Section B2.1.1]

B2.1 AGING MANAGEMENT PROGRAMS

B2.1.1 BATTERY RACK INSPECTIONS

Program Description

The structural integrity of the support racks for various station batteries within the scope of license renewal is verified by inspecting for loss of material. 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. Potential degradation of the racks is evaluated for its effect on structural integrity, and repairs are implemented as necessary. Maintenance activities to implement necessary repairs are initiated through the Corrective Action Program. Where seismically designed, the inspections help ensure that the integrity of the racks is maintained during a seismic event so that the batteries remain operable.

The battery rack inspections are consistent with the inspections performed for other types of supports by the Structures Monitoring Program.

The structural inspections of buildings and structures are addressed in the Structures Monitoring Program.

Aging Management Program Elements

A comparison of the *Battery Rack Inspections* to ten elements described in Appendix A of NUREG-1800 (Reference B-1) is provided below.

Scope of Program

Battery racks provide support and restraint for various batteries that supply power to equipment in the plant. The battery racks for the following batteries are in-scope:

- Millstone Unit 2 Main station batteries
- Millstone Unit 2 Non-safety-grade turbine battery
- Millstone Unit 2 Security diesel generator battery
- Millstone Unit 3 Main station batteries
- Millstone Unit 3 Non-safety-grade battery 5
- Millstone Unit 3 Diesel-driven fire pump batteries
- Millstone Unit 3 Station blackout diesel generator battery
- 345-kV 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.

Preventive Actions

The inspection activities for battery racks and associated equipment are designated condition monitoring. No preventive actions are performed.

Parameters Monitored or Inspected

The battery support racks are visually inspected to ensure that their physical condition is not degraded. Where installed, items such as anchorages (including bolting to the building structure), bracing and supports, side and end rails, and spacers are also inspected.

Detection of Aging Effects

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.

Monitoring and Trending

Battery rack inspections determine the extent of aging effects. The materiel 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 or mitigative actions in a timely manner. Engineering evaluations assess whether the extent of aging could cause a loss of intended function.

Acceptance Criteria

The acceptance criterion for visual inspections is the absence of anomalous indications that are signs of degradation. Occurrence of degradation that is adverse to quality will be entered into the Corrective Action Program. Engineering evaluations determine whether observed deterioration of materiel condition is significant enough to compromise the ability of a battery rack to perform its intended function.

Corrective Actions

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. Any resultant maintenance or repair activities are performed in accordance with applicable engineering requirements and the maintenance and work control procedures. The Corrective Action Program provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable. Where evaluations are performed without repair or replacement, engineering analysis considers reasonable assurance that the intended function of the system, structure, or component is maintained consistent with the current licensing basis. The Corrective Action Program identifies repetitive discrepancies, considers the extent of the condition, and initiates additional corrective action, as appropriate, to preclude recurrence.

Confirmation Process

QA procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B.

If degradation that requires repair is identified during monitoring activities, corrective actions are implemented. Additionally, inspection results from reviews by outside organizations are used to help confirm the maintenance of plant integrity and materiel condition.

Administrative Controls

Administrative and implementing procedures are reviewed, approved, and maintained as controlled documents in accordance with the procedure control process and the Quality Assurance Program.

Operating Experience

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.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Restraint Rods Between Battery Cells Are Severely Corroded, Resulting in a Significant Loss of Metal</u>

The restraining rods between two pairs of battery cells for the Millstone Unit 2 125-volt DC station battery were severely corroded, resulting in a significant loss of material. A wet spot was observed on the floor between one pair of cells. There was also evidence of prior leakage on the floor between another pair of cells in the form of a large stain with a trail leading to the floor drain. This location was not observed to be leaking when the condition was identified. The corrosion did not compromise the integrity of the battery rack. The source of leakage was identified and the restraining rods were repaired.

Enhancements

Enhancement 1: Inclusion of In-Scope Battery Racks

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.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 1.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Scope of Program**

  This program element identifies the battery rack and support components that are managed by the *Battery Rack Inspections* program. Any battery racks in the scope of license renewal and not currently included in the *Battery Rack Inspections* program will be added to the applicable inspection procedures.

Enhancement 2: Inspection Criteria

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.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 2.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Detection of Aging Effects**

  The changes in the implementing procedures for the visual inspections will ensure that degradation of the support racks is identified before there is a loss of intended function.

Conclusion

The *Battery Rack Inspections* program ensures the effects of aging associated with 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.

B2.1.2 BORAFLEX MONITORING

Program Description

Millstone Unit 2

Boraflex Monitoring manages the aging effect of change of material properties on the sheets of neutron-absorbing materials affixed inside spent fuel racks. Millstone Unit 2 spent fuel storage racks are designed so that the reactivity condition of the spent fuel pool will result in a K_{eff} less than or equal to 0.95 at all times. 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 *Boraflex Monitoring* program includes the following Millstone Unit 2 activities:

- Selection of high-exposure storage cells for sample material retrieval and analysis to confirm material condition such that 5 percent sub-criticality can be maintained.
- Blackness testing to monitor the size of shrinkage-induced gap formation and gap growth.
- Monitoring of the pool's reactive silica concentration as an indicator of Boraflex dissolution rate.

The EPRI RACKLIFE model determines the individual Boraflex panel degradation based on the measured silica concentrations and irradiation history of the Boraflex panels. The use of RACKLIFE to determine the extent of Boraflex degradation is further discussed in Operating Experience section of this AMP.

Millstone Unit 3

Boraflex panels are installed in the Millstone Unit 3 spent fuel racks but are not credited for neutron absorption and criticality prevention of the spent fuel pool. Therefore, the Boraflex monitoring program at Millstone Unit 3 are not included in this AMP.

NUREG-1801 Consistency

The *Boraflex Monitoring* program is an existing program that is consistent with NUREG-1801, Section XI. M22, "Boraflex Monitoring."

Exceptions to NUREG-1801

The *Boraflex Monitoring* program takes no exceptions to the aging management program described in NUREG-1801, Section XI.M22, "Boraflex Monitoring."

Enhancements

The *Boraflex Monitoring* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M22, “Boraflex Monitoring.”

Operating Experience

The existing Millstone Unit 2 spent fuel racks were installed in 1986. In May of 1997, Millstone informed the Nuclear Regulatory Commission (NRC) that taking samples directly from in-service Millstone Unit 2 spent fuel pool racks for surveillance testing would replace the previous method of removing prefabricated sample coupons. The need for switching to extracting samples from in-service panels was due to the erosion of the prefabricated sample coupons. To date, neutron attenuation testing of in-service Boraflex panels has confirmed that the Boraflex panels have had no detectable loss of B-10 density from the manufactured condition.

Blackness testing is periodically performed to (1) monitor the size of the shrinkage-induced gap formation and gap growth in the Boraflex panels and (2) confirm the presence of the absorber material. Three blackness tests have been performed on selected Boraflex panels in the spent fuel pool racks, with the last such test performed in 1996. Some shrinkage-induced gap formation has been noted in the Boraflex panels. The largest individual gap found was 1.9 inches. A few Boraflex panels had 2 gaps. The panel with the largest 2-gap combination had a total gap of 2.8 inches. This provides adequate margin to the 5.65-inch gap assumed in the criticality analysis.

Spent fuel pool measurements for silica have shown typical values of 1.5 to 2.5 ppm over the last several years. These silica concentrations have been monitored for any unusual trends. Millstone has been a participant in the EPRI Boraflex Working Group, and the EPRI RACKLIFE model has been used to track the Boraflex condition. RACKLIFE uses the measured silica concentrations, along with the individual Boraflex panel irradiation history to determine individual Boraflex panel degradation. The use of the RACKLIFE model independently confirms the conclusion that Millstone Unit 2 Boraflex has undergone acceptable minimal thickness loss.

Conclusion

The *Boraflex Monitoring* 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.

B2.1.3 BORIC ACID CORROSION

Program Description

The *Boric Acid Corrosion* program manages the aging effect of loss of material and ensures that systems, structures, and components susceptible to boric acid corrosion are properly monitored. The program ensures that boric acid corrosion is consistently identified, documented, evaluated, trended, and SCCs are effectively repaired. The program addresses the structures and components composed of susceptible materials, which includes carbon and low alloy steels, copper, and cast iron. The program inspects the surfaces of structures and components, from which the borated water may have leaked. Potential leakage sites include Inconel Alloy 600 base metal and 82/182 dissimilar metal welds, Inconel Alloy 690 base metal and 52/152 welds.

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. The recommendations of NRC Generic Letter (GL) 88-05 (Reference B-2) and NRC Bulletins 2002-01 (Reference B-21) and 2002-02 (Reference B-23) have been addressed in the program.

NUREG-1801 Consistency

The *Boric Acid Corrosion* program is an existing program that is consistent with NUREG-1801, Section XI.M10 “Boric Acid Corrosion.”

Exceptions to NUREG-1801

The *Boric Acid Corrosion* program takes no exceptions to the aging management program described in NUREG-1801, Section XI.M10 “Boric Acid Corrosion.”

Enhancements

The *Boric Acid Corrosion* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M10 “Boric Acid Corrosion.”

Operating Experience

Operating experience indicates that Millstone has been aggressive in the identification and elimination of borated water leakage. Corrective actions have been effectively implemented to mitigate active leakage prior to experiencing a loss of intended function.

The Boric Acid Corrosion program has been developed to address industry experience reflected in Generic Letter 88-05 and updated to reflect the information from NRC Bulletins 2002-01 and 2002-02. Evidence of boric acid residue has been previously identified and addressed. Borated water leaks have typically occurred at valve packings or bolted connections. These leaks typically are corrected by minor adjustments and have had only minor effect on equipment or structures in the vicinity of the leakage.

Reactor Vessel Head Examinations

As a result of on-going industry vessel head issues and issuance of NRC Bulletin 2002-01; examinations of the reactor vessel heads and penetrations have been performed during the subsequent refueling outages for Millstone Units 2 and 3. Because the Davis-Besse plant had identified severe degradation during their vessel head ultrasonic examinations, the vessel head examinations at Millstone Units 2 and 3 have been performed to ensure that similar degradation does not exist.

Millstone Unit 2 Reactor Vessel Head Examinations

During the 2002 Millstone Unit 2 refueling outage, an evaluation was performed of the reactor vessel head's overall condition. A thorough visual examination of all exposed external surfaces above the head was performed for evidence of boron leakage. The perimeter and seams of the head insulation were specifically scrutinized for signs of boric acid coming out from under the insulation or evidence of leakage from above.

An ultrasonic examination was conducted on all of the reactor vessel head penetration nozzles. The examination was performed to identify any discontinuities contained within the volume of the tube material and to detect any evidence of leakage between the external Alloy 600 nozzle surface and the low-alloy steel vessel head penetration's internal surface above the pressure boundary J-groove weld. Ultrasonic examination of this interference fit area also provided a reliable verification of the condition for the low-alloy steel adjacent to the nozzles. Additional ultrasonic longitudinal wave scanning of the vessel head from the clad surface underside in selected areas provided additional assurance that this material is in sound condition.

Liquid penetrant examinations were performed on all of the nozzles that recorded any ultrasonic indications. Three nozzles were determined to contain indications of discontinuities that required engineering evaluation. The ultrasonic data supported the determination that these nozzles were not leaking. However, for one nozzle, the indication had significantly propagated into the J-groove weld region. Thus, for additional assurance, a bare metal visual examination was performed on that nozzle to confirm that no boron residue was present on the exterior surface of the vessel head near the nozzle. The ultrasonic data from the recently completed Davis-Besse vessel head examinations, which identified severe degradation, was reviewed for additional assurance that a similar condition did not exist at Millstone.

The three nozzles with indications were repaired. After the original CEDM nozzles were machined away from the lower extent up into the volume of the vessel head, liquid penetrant examinations were conducted on the bored area of the vessel head. This surface exam interrogated the vessel head, J-groove weld, and the beveled portion of the original CEDM nozzle. No indications were recorded. After repairs were completed, liquid penetrant and ultrasonic examinations were performed on the repair welds, and no indications were recorded.

Millstone Unit 3 Reactor Vessel Head Examinations

In accordance with NRC Bulletin 2001-01, Millstone Unit 3 is in the lowest category of susceptibility for CEDM nozzle cracking. During a recent Millstone Unit 3 refueling outage, an evaluation was performed for the reactor vessel head overall condition. A thorough visual examination was performed on all exposed external surfaces for evidence of boron leakage.

The examinations were performed on the exposed vessel head base material for evidence of degradation and the CRDM penetration annular region between the CRDM nozzles and vessel head base material for evidence of Reactor Coolant System leakage. The entire top surface of the vessel head base material was inspected, as well as all 78 CRDM penetrations (a full 360^{o} around). A dual verification process was utilized for 100% of the locations within the inspection scope.

The results of this examination concluded that there was no evidence of material degradation or Reactor Coolant System leakage. Millstone Unit 3 has also had an analysis performed that shows that there will be a gap between all of the CRDM penetrations and the reactor vessel head during operation to provide a leak path should a through wall crack develop in a penetration nozzle.

Other Operating Experience

The boric acid leakage inspections and subsequent corrective actions have been successful in maintaining Reactor Coolant System integrity and will continue into the extended period of operation. In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Active Contaminated Boric Acid Leak and Accumulation on the Floor by Charging Pump

A plant equipment operator identified active boric acid leakage from the threaded plug test connection downstream of a valve in the Charging System. As the threaded plug is not part of the pressure boundary, the upstream valves were checked closed by the operator, which stopped the leak. The boric acid was cleaned up by Health Physics. The condition was evaluated by Engineering. The Inservice Inspection Program performed a follow-up inspection to ensure that no additional leakage was occurring until the valve could be properly overhauled. No further leakage was detected. The valve was overhauled to preclude possible future leakage by the seat of this pressure boundary valve.

Boric Acid Leaks Found on Two Safety Injection Loop Injection Check Valves

During a boric acid leak inspection, two safety injection check valves were found to be leaking boric acid. Engineering determined the valves required repair, which was accomplished.

Visual Inspection Found Evidence of Leakage at Two Pressurizer Heater Penetrations

During ISI visual inspection of the pressurizer heater penetrations for Millstone Unit 2, two penetrations were found to show indication of leakage with the presence of boron encircling the penetration. A 100 percent inspection of the remaining heater penetrations did not identify any additional areas of leakage. The condition was determined to be reportable to the NRC. A design change was generated to address the issue of installing mechanical nozzle seal assembly clamps on the leaking heater penetrations to prevent leaking. The mechanical nozzle seal assembly clamp is a Westinghouse designed alternative replacement for repair of leaking nozzles.

Conclusion

The *Boric Acid Corrosion* 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.

B2.1.4 BURIED PIPE INSPECTION PROGRAM

Program Description

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.

The application of protective coatings and wraps is in accordance with the requirements of Industry Standard AWWA C203 (Reference B-12). 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 *Buried Pipe Inspection Program* evaluates the condition of the coatings and/or wraps as an indication of the condition of the underlying materials.

The use of impressed-current cathodic protection for in-scope piping is limited to the off-gas pipeway for Millstone Unit 2 and the Supplementary Leak Collection And Release System pipe for Millstone Unit 3.

A baseline inspection of the in-scope buried components, located in a damp soil environment, will be performed for a representative sample of each combination of material and protective measures identified below:

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

Unit 3 – Copper Alloy / Uncoated

The program requires that the inspection be completed using available industry guidance such as NACE Standard RP 0169 (Reference B-13).

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.

NUREG-1801 Consistency

The *Buried Pipe Inspection Program* is an existing program that is consistent with the following sections of NUREG-1801, with the clarification and exceptions described below:

- Section XI.M28, “Buried Piping and Tanks Surveillance” [with exception]
- Section XI.M34, “Buried Piping and Tanks Inspection.” [without exception]

Chapter XI, Sections M28 and M34 in NUREG-1801, include requirements for managing the aging of buried tanks and reference industry documents applicable to buried tank protection and surveillance. Since there are no buried tanks within the scope of license renewal, these requirements do not apply.

Exceptions to NUREG-1801

Exception 1: XI.M28 -- Trending of Cathodic Protection Performance

The coating conductance and current requirement for cathodic protection are not trended versus time. Performance parameters of the impressed current cathodic protection systems are periodically checked and compared to predetermined values to verify proper operation. A review of Millstone internal operating experience identified no specific instances where degradation has occurred for the buried piping with cathodic protection.

Program Elements Affected

- **Monitoring and Trending**

  The NUREG-1801 program description indicates that the coating conductance or current versus time should be trended. As noted above, the trending of these parameters is not performed. Periodic verification that the performance parameters of the impressed current cathodic protection systems satisfy the predetermined values for proper operation meets the intent of the NUREG-1801 program element.

Exception 2: XI.M28 -- Establishing Preventive Measures During Initial Installation of the Piping

NACE Standard RP 0169, identified in NUREG-1801, may not have been utilized in establishing the preventive measures during initial installation of the piping. A baseline inspection, as discussed in Enhancement 1 below, will be performed to address this exception.

Program Elements Affected

- **Scope of Program**

  The NUREG-1801 program relies on measures such as coating and wrapping in accordance with NACE Standard RP 0169 to manage the effects of corrosion on in-scope buried piping. As noted above, it can not be documented that this standard was utilized during installation of the in-scope buried piping.

Enhancements

Enhancement 1: Baseline Inspection

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 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. These inspections will use available industry guidance such as NACE Standard RP 0169. With these inspections, the Millstone program for buried piping and valves will meet the intent of the program described in NUREG-1801, Sections XI.M28 with regards to establishing that the protective measures put in place during construction are effective. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 3.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.M28 -- Scope of Program**

  The baseline inspections will use industry standards, such as NACE Standard RP 0169, for guidance and will resolve the exception to the NUREG-1801 program.

- **XI.M28 -- Detection of Aging Effects**

  The baseline inspections will be an effective method of evaluating the condition of the buried components and protective coatings. This is an acceptable alternative for detecting the aging of these components.

Enhancement 2: Buried Piping Inspections

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 that the condition of the buried piping and protective coatings continue to be acceptable and the protective coatings and wrappings remain intact.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 4.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.M34 -- Scope of Program**

  The maintenance and work control procedures will be used to perform periodic inspections when in-scope components are excavated for maintenance or for any other reasons.

- **XI.M34 -- Detection of Aging Effects**

  The maintenance and work control procedures will be used to perform periodic inspections when in-scope components are excavated for maintenance or for any other reasons.

Operating Experience

During Millstone's operating history, monitoring of cathodic protection has been successful in identifying degraded conditions and implementing appropriate corrective actions.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Off-Gas Anode Is Reading 0.0 Amps

During performance of cathodic protection system rectifier maintenance, it was noted that an anode had a low reading of 0.0 amps. As a result, a work order was developed to perform excavation as required to facilitate the replacement of the identified anode for the off-gas pipe from Millstone Unit 2 to the Millstone Stack. Contingency plans were made to replace additional anodes if it was discovered that the identified anode 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 engineering were held which included review of photographs of the anodes that were recently replaced at another location in the off-gas piping 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 unearthed anodes.

Fire Water Piping Corrosion Assessment

The corrosion mechanisms seen in fire water 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 3 years, and no significant degradation in overall loop flow has been noted. Further, due to the recent permanent shutdown of Millstone Unit 1, several parts of the site’s fire water above ground piping have been removed and made available for detailed inspection.

All of the Millstone 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 remainder of the above ground piping segments inspected were clean.

Since the fire pumps are run frequently, the piping associated with the pumps’ suction lines and tank recirculation lines were 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. Much of this corroded piping, and the tanks themselves, were replaced as part of the fire tank replacement project.

Conclusion

The *Buried Pipe Inspection 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.

B2.1.5 CHEMISTRY CONTROL FOR PRIMARY SYSTEMS PROGRAM

Program Description

Chemistry Control for Primary Systems Program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or cracking. Water chemistry control is in accordance with the guidelines in EPRI TR-105714 (Reference B-3) for primary water chemistry.

Verification of the effectiveness of the *Chemistry Control for Primary Systems Program* is provided by the Work Control Process. 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 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 Primary Systems Program.*

NUREG-1801 Consistency

The *Chemistry Control for Primary Systems Program* is an existing program that is consistent with NUREG-1801, Section XI.M2, “Water Chemistry”, with the exception described below.

Exceptions to NUREG-1801

Exception 1: Use of a Later Revision of TR-105714

NUREG-1801, Section XI.M2, “Water Chemistry” identifies that the applicable EPRI guideline for primary water chemistry is TR-105714, Revision 3 or later revision approved by the staff. To date, Revision 3 is the latest revision approved by the staff. The *Chemistry Control for Primary Systems Program* is based on Revision 4 of this same EPRI guidance. The later revision has incorporated additional industry operating experience not available as 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. Therefore, use of the later revision is consistent with the intent of the NUREG-1801 program.

Program Elements Affected

- **Scope of Program**

  The scope of the program identifies the applicable revision for TR-105714 as Revision 3 or later revision approved by the staff. The *Chemistry Control for Primary Systems Program* is based on Revision 4 of this same EPRI guidance. The later revision has incorporated additional industry operating experience not available as 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. Therefore, use of the later revision is consistent with the intent of the NUREG-1801 program.

Enhancements

The *Chemistry Control for Primary Systems Program* does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M2, “Water Chemistry.”

Operating Experience

Development of Strategic Plans

As the result of plant operating experience, strategic plans have been developed for both Millstone Units 2 and 3 to establish goals and objectives for optimizing primary system water chemistry.

Millstone Unit 2

From initial start-up until installation of the replacement steam generators in 1992, Millstone Unit 2 maintained the primary coolant at a “close to neutral” pH. Lithium hydroxide was used to counteract the chemical effects of boric acid. Subsequent to the steam generator replacement, a modified pH regime was implemented. This program gradually increases the pH of the primary coolant during the fuel cycle. No primary coolant related corrosion concerns have been identified since implementing this program.

Also, following the steam generator replacement, Millstone Unit 2 initiated nickel monitoring and clean-up activities during each start-up. Minimizing the dissolved nickel concentration in the primary coolant prior to operation, can control the amount of nickel deposited in the core and subsequently activated as Co-58.

Millstone Unit 3

In the early 1990’s, Millstone Unit 3 experienced an axial offset anomaly which was attributed to operation with a lower pH regime than those implemented during previous operating cycles. Subsequently, Millstone Unit 3 adopted a modified chemistry control program, which involved operation at a higher primary coolant pH. Since implementing this chemistry program, axial offset anomalies have not been a significant issue for the unit.

Elevated silica levels were observed in the spent fuel pool during the Millstone Unit 3 Spring 1999 refueling operations, refueling water storage tank, and primary coolant and evaluated during the operating cycle ending in the Spring of 1999. Efforts to reduce the silica concentration in the primary coolant prior to start-up were not successful in reducing the concentration below the acceptable limits. Primary coolant feed and bleed was initiated immediately following plant start-up to reduce the silica concentration.

Subsequently, the silica concentration in the refueling water storage tank was reduced prior to entering the refueling outage using a reverse osmosis unit. Reducing the pre-outage refueling water storage tank silica concentration to less than 900 ppb has been successful in reducing the post-outage primary coolant silica concentration to acceptable levels. Additionally, use of the reverse osmosis unit has removed some radioisotopes that are difficult to remove with demineralizers, resulting in a primary coolant curie reduction.

Additional Operating Experience

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Reactor Coolant System Sulfate Concentration Greater Than Action Level 1 Limit

In preparation for entry into Mode 4 following the Fall 2002 refueling outage, Reactor Coolant System sulfate concentration was measured to be 239 ppb and verified to be greater than the Mode 5 Action Level 1 limit (and Mode 4 Action Level 2 limit) of 150 ppb. Initial investigation determined that the probable cause was resin degradation in the delithiating demineralizer. Immediate corrective actions included securing the delithiating demineralizer and reloading it with new resin. In addition, a long-term corrective action was developed and completed to incorporate into plant procedures, methods of quickly identifying degraded resin following the placement of a demineralizer in service.

Silica From The Spent Fuel Pool Migrated to The Refueling Water Storage Tank

During the Millstone Unit 3 Spring 1999 refueling operations, water with high silica concentrations was transported from the spent fuel pool to the refueling water storage tank. As a result, a cleanup evolution using reverse osmosis was implemented. Silica from the refueling water storage tank was reduced from 2.7 to approximately 1.0 ppm in about eight weeks. Additionally, the Liquid Radwaste Treatment System was able to treat colloidal silica/cobalt.

High Reactor Coolant Chloride Concentration

Subsequent to placing a demineralizer in service in the letdown system, the results of a daily sample indicated that the chloride concentration in the reactor coolant system was 124 ppb. A confirmatory chloride decontamination factor sample across the demineralizer was taken. The results showed influent chlorides of 129 ppb and effluent chlorides of 145 ppb. The demineralizer was secured and effluent chlorides in the letdown system dropped to 14 ppb. The demineralizer resin was replaced. Further investigation identified the root cause as a programmatic failure since the governing procedures were incomplete. The corrective actions that were implemented included creation of a chemistry procedure for sampling and flushing the reactor coolant system letdown demineralizer, which provides guidance to chemistry technicians for placing a demineralizer in service. The procedure also established specific limits for chlorides, fluorides, lithium, and boron decontamination factors that must be met prior to placing a demineralizer in service.

Conclusion

The *Chemistry Control for Primary Systems 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.

B2.1.6 CHEMISTRY CONTROL FOR SECONDARY SYSTEMS PROGRAM

Program Description

Chemistry Control for Secondary Systems 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. Water chemistry control is in accordance with the guidelines in EPRI TR-102134 (Reference B-4) for secondary water chemistry.

Verification of the effectiveness of the *Chemistry Control for Secondary Systems Program* is provided by the Work Control Process. 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 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.*

NUREG-1801 Consistency

The *Chemistry Control for Secondary Systems Program* is an existing program that is consistent with NUREG-1801, Section XI.M2, "Water Chemistry", with the exception described below.

Exceptions to NUREG-1801

Exception 1: Use of a Later Revision of TR-102134

NUREG-1801, Section XI.M2, "Water Chemistry" identifies that the applicable EPRI guideline for secondary water chemistry is TR-102134, Revision 3 or later revision approved by the staff. To date, Revision 3 is the latest revision approved by the staff. The *Chemistry Control for Secondary Systems Program* is based on Revision 5 of this same EPRI guidance. The later revision has incorporated additional industry operating experience not available as 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. Therefore, use of the later revision is consistent with the intent of the NUREG-1801 program.

Program Elements Affected

- **Scope of Program**

  The scope of the program identifies the applicable Revision for TR-102134, PWR Secondary Water Chemistry Guidelines, as Revision 3 or later revision approved by the staff. The *Chemistry Control for Secondary Systems Program* is based on Revision 5 of this same EPRI guidance.The later revision has incorporated additional industry operating experience not available as 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. Therefore, use of the later revision is consistent with the intent of the NUREG-1801 program.

Enhancements

The *Chemistry Control for Secondary Systems Program* does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M2, "Water Chemistry."

Operating Experience

Development of Strategic Plans

As the result of plant operating experience, strategic plans have been developed for both Millstone Units 2 and 3 to establish goals and objectives for optimizing secondary system water chemistry.

Millstone Unit 2

For Millstone Unit 2, the original steam generators supplied by Combustion Engineering experienced significant degradation, including tube cracking and denting, as a result of extensive condenser in-leakage during Cycle 1 operation. The presence of copper containing alloys within the secondary system during early operating cycles increased the extent and severity of the observed corrosion. The original steam generators were subsequently replaced. Full-flow condensate polishers were retrofitted and have been utilized since Cycle 2 to protect against condenser in-leakage.

ETA was introduced in early 1993, replacing ammonia as the pH control additive. ETA has been responsible for a significant reduction in flow-accelerated corrosion and feedwater iron values.

Because of a combination of these initiatives, no corrosion related tube defects have been identified for the replacement steam generators to date.

Millstone Unit 3

Millstone Unit 3 started using ETA in early 1994 as the pH control additive. ETA has been responsible for a significant reduction in flow-accelerated corrosion and feedwater iron values. A full-flow condensate polishing facility was also installed. No corrosion related tube defects have been identified for the steam generators to date.

Additional Operating Experience

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Oxygen Ingress to Condensate Storage Tank Caused Dissolved Oxygen Concentration to Increase to 1 PPM

Air ingress to the condensate storage tank occurred during filling from vendor make-up water. As an immediate corrective action, the condensate storage tank oxygen level was further monitored while a nitrogen sparge was performed to ensure that oxygen levels dropped back below the 0.10 ppm limit. The oxygen concentration was successfully brought back below the required limits. Make-up water vendor logs were reviewed to determine the quality of the water during the condensate storage tank fill. The vendor logs confirmed that because of a chemical addition equipment problem, the dissolved oxygen of the make-up water had spiked during the filling of both the Millstone Unit 2 and 3 condensate storage tanks. Unit 3 saw no increase in dissolved oxygen during this period. Additional testing confirmed that the volume of air added to the condensate storage tank most likely came from vendor make-up water.

Entered Chemistry Action Level 1 for Condensate Pump Discharge Dissolved Oxygen

Dissolved oxygen in the condensate pump discharge increased to 15.2 ppb, as measured by the in-line instrument, and 20 ppb, as measured using Chemets. A condensate pump's mechanical seal was determined to be the source of the leakage. A request was generated to replace the mechanical seals which resulted in Engineering evaluating the replacement of this type mechanical seal. The pump vendor was contacted and it was determined that replacing the mechanical seals would prevent air in-leakage. All pump seals were rebuilt/replaced during the Spring 1999 refueling outage. Subsequently, a design modification was implemented to replace the seals with a mechanical seal with an improved design for preventing air in-leakage. This modification has been implemented for one condensate pump and the performance is being evaluated by Engineering prior to implementing the same design change on the other condensate pumps.

Conclusion

The *Chemistry Control for Secondary Systems 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.

B2.1.7 CLOSED-CYCLE COOLING WATER SYSTEM

Program Description

The *Closed-Cycle Cooling Water System* program manages the aging effect of loss of material through the maintenance of process fluid chemistry and performance monitoring of closed-cycle cooling water systems to ensure parameters remain within acceptable limits.

The program is based directly on guidance contained in EPRI Report TR-107396 (Reference B-27).

NUREG-1801 Consistency

The *Closed-Cycle Cooling Water System* program is an existing program that is consistent with NUREG-1801, Section XI.M21, “Closed-Cycle Cooling Water System”, with the exception described below.

Exceptions to NUREG-1801

Exception 1: Heat Exchanger Performance Testing

Performance testing of the closed-cycle cooling water side of heat exchangers is not performed. Consistent with NUREG-1801, the *Closed-Cycle Cooling Water System* program maintains low corrosion rates on the closed-cycle cooling water side by using corrosion inhibitors. Past inspections of internal surfaces of the closed-cycle cooling water side of the heat exchangers performed during normal maintenance activities have indicated that the corrosion inhibitors have been effective in minimizing corrosion. Eddy current testing of heat exchanger tubes shows no signs of corrosion activity.

Program Elements Affected

- **Parameters Monitored/Inspected**

  The NUREG-1801 recommended parameters to be monitored for a heat exchanger (i.e., heat exchanger flow, inlet and outlet temperatures, and differential pressure) are not specifically monitored by the program to indicate corrosion buildup. Instead, the *Closed-Cycle Cooling Water System* program relies on the use of corrosion inhibitors to minimize the corrosion and to maintain heat exchanger performance.

  Lack of negative operating experience indicates that this is acceptable.

- **Detection of Aging Effects**

  As discussed above, performance testing is not performed on the closed-cycle cooling heat exchangers; so the parameters specified in the NUREG-1801 program are not periodically monitored. The *Closed-Cycle Cooling Water System* program eliminates the need for this monitoring by the use of corrosion inhibitors.

- **Monitoring and Trending**

  As discussed above, periodic performance tests are not performed for closed-cycle cooling water 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 *Closed-Cycle Cooling Water System* program relies on the use of corrosion inhibitors to minimize the corrosion and to maintain heat exchanger performance eliminating the need for periodic performance testing.

- **Acceptance Criteria**

  As discussed above, periodic performance testing of closed-cycle cooling water system heat exchangers is not performed. Therefore, the analysis and trending of system and component performance test results described in the NUREG-1801 program can not be performed.

  Lack of negative operating experience indicates that this is acceptable.

Enhancements

The *Closed-Cycle Cooling Water System* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M21, “Closed-Cycle Cooling Water System.”

Operating Experience

Operating experience indicates that chemistry parameters and component performance can drift from their acceptable ranges, but that the *Closed-Cycle Cooling Water System* program is effective in identifying these anomalies, implementing corrective action, and trending the parameters. When chemistry results have reached a predetermined level, corrective actions have been properly completed to return the parameter to within acceptable limits, or compensatory measures have been implemented. Similarly, supervision and control room personnel have been notified when component performance has fallen outside proceduralized ranges or values, and the necessary corrective actions have been taken.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>High pH in Millstone Unit 3 Reactor Plant Component Cooling Water System</u>

The pH for the Millstone Unit 3 Reactor Plant Component Cooling Water System trended high, exceeding the upper specification limit of 9.5. The cause of the pH trend appeared to be the generation of ammonia. Ammonia generation is common in systems that use hydrazine as a corrosion inhibitor. Testing for ammonia was performed, and ammonia levels were found to be elevated. Specific conductivity trends and computer models of pH were consistent with elevated ammonia in the cooling water. An ion exchanger was installed to remove the ammonia.

<u>Lower pH Trend on One Emergency Diesel Generator Cooling Water</u>

A declining pH trend was noticed in the Millstone Unit 2 jacket cooling water system for one emergency diesel generator. The diesel vendor specified a lower limit of 8.5. Chemistry supervision was notified and the pH was raised to maintain jacket water to within the vendor-specified control band. The pH for the other emergency diesel generator cooling water did not exhibit such a trend. Microbiological activity was believed to be the cause for the lowering pH. The investigation and cooling water sampling indicated that 1) the pH did not decrease below the lower limit, and 2) some biological activity was present, but not in an amount to be of concern.

<u>Chill Water Chlorides and Conductivity Have Exhibited an Adverse Increasing Trend</u>

Chill water chlorides and conductivity had exhibited an adverse increasing trend. Although system chemistry remained in specification, the chloride concentration was approaching the 2 ppm limit, as discovered during routine sampling of the Chill Water System. Tube leakage in one or more of the system chillers was the suspected cause. Chill water chlorides were reduced using a temporarily installed demineralizer. Both pressure and vacuum testing were performed on the chillers without indication of leaks. The system continues to be sampled and addressed. It remains within current chemical specifications.

NDE of Reactor Building Closed Cooling Water System Piping In Containment Shows 45 Degree Elbow Does Not Meet Wall Thickness Required

Sample NDE ultrasonic testing of the Reactor Building Closed Cooling Water System piping in Containment resulted in a failed structural evaluation of a 45-degree elbow in a 10-inch return header. A band of pipe wall immediately adjacent to, and downstream of the weld was measured to be below minimum wall thickness requirements. A structural evaluation was performed to evaluate this condition. The degraded condition was found to be caused by a weld fit-up problem and not related to service induced degradation. Sample expansion UT inspections were performed on an additional five similar configuration locations and all were found to be acceptable. Weld repairs of the 45-degree elbow were completed and the system was returned to service.

Conclusion

The *Closed-Cycle Cooling Water System* 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.

B2.1.8 ELECTRICAL CABLES AND CONNECTORS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

This program manages the aging effects of cracking and embrittlement to ensure that electrical cables and connectors within the scope of license renewal that are exposed to an adverse localized environment (but not subject to the environmental qualification requirements of 10 CFR 50.49) are capable of performing their intended function. Adverse localized environments may be caused by heat, radiation or moisture. This program considers the technical information and guidance provided in NUREG/CR-5643 (Reference B-14), IEEE Standard P1205 (Reference B-15), SAND96-0344 (Reference B-16), and EPRI TR-109619 (Reference B-17). The program uses a sampling methodology where selected cables and connectors within the scope of license renewal from accessible areas with an adverse localized environment are inspected. These samples represent, with reasonable assurance, cables and connectors in inaccessible areas with an adverse localized environment. At least once every ten years, representative samples of such cables and connectors are visually inspected for cracking or embrittlement.

Fuse holders (including fuse clips and fuse blocks) are considered passive electrical components. Fuse holders (including fuse clips and fuse blocks) are included in the screening process in the same manner as terminal blocks and other types of electrical connections as described in Section 2.1.5.4, Electrical/I&C Screening. Consistent with ISG-5, fuse holders that are a part of a larger assembly inside the enclosure of an active component, such as switchgear, power supplies, power inverters, battery chargers, and circuit boards, are considered piece parts of the larger assembly. Since piece parts and sub-components in such an enclosure are inspected regularly and maintained as part of the normal maintenance and surveillance activities, they are considered not subject to aging management review.

ISG-5 addresses fuse holders 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. Fuse holders meeting these 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 *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* (if needed for fuse holders) will consider the aging stressors for the metallic clips.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 6.

NUREG-1801 Consistency

The program for *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* is a new program that will be consistent with NUREG-1801, Section XI.E1, “Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” and the program as supplemented by NRC ISG-05 (Reference B-37).

Exceptions to NUREG-1801

The *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program takes no exceptions to the aging management program described in NUREG-1801, Section XI.E1, “Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” and the revised Section XI.E1, “Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” program described in NRC ISG-05.

Enhancements

The program for *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* is a new program.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 5.

Operating Experience

The *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program is a new program, no operating experience associated with this program is available.

Conclusion

The *Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* 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.

B2.1.9 ELECTRICAL CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS

Program Description

This program manages the aging effects of cracking and embrittlement for electrical cables within the scope of license renewal that are used in circuits with sensitive, low-level signals, such as radiation monitoring and nuclear instrumentation (but not subject to the environmental qualification requirements of 10 CFR 50.49), and are installed in adverse localized environments caused by heat, radiation or moisture. The program relies on routine calibrations required by Technical Specifications and performed as part of the plant surveillance test program to identify age-related degradation. The program also relies on an alternate test methodology for cables when they are not energized during calibrations. This program considers the technical information provided in NUREG/CR-5643 (Reference B-14), IEEE Std. P1205 (Reference B-15), SAND 96-0344 (Reference B-16), and EPRI Technical Report TR-109619 (Reference B-17).

NUREG-1801 Consistency

The *Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits* is an existing program that is consistent with the aging management program described in NUREG-1801, Section XI.E2, "Electrical Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits" and the program as modified in draft NRC ISG-15 (Reference B-44).

In accordance with the NUREG-1801 program, the Millstone program relies on the performance of surveillance testing to detect age-related degradation (i.e., reduced insulation resistance) and considers the technical information and guidance provided in NUREG/CR-5643, IEEE 1205, SAND96-0344, and EPRI TR-109619. When the applicable in-scope cables are not energized during routine calibrations required by Technical Specifications and performed as part of the plant surveillance test program, an alternate method, described in Enhancement 1 below, is used to identify age-related degradation.

Exceptions to NUREG-1801

The *Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits* program takes no exceptions to the aging management program in NUREG-1801, Section XI.E2, "Electrical Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits."

Enhancements

Enhancement 1: Testing of Cables for Instruments That Are Not Calibrated In Situ'

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, such as the Millstone Unit 2 and 3 area radiation monitors. Testing may include insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable insulation condition. The test frequency will be based on Engineering evaluation and will not exceed 10 years. The first tests will be completed prior to the period of extended operation. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 7.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Scope of Program**

  This program element identifies the specific components subject to aging management for license renewal. For specific plant equipment (such as the Millstone Unit 2 and 3 area radiation monitors), where calibration of the instrumentation is not performed in-situ, this program will perform alternative testing to confirm the condition of insulation for the cables and connectors.

- **Detection of Aging Effects**

  This program element identifies methods or techniques to ensure timely detection of aging effects. The *Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits* program will perform alternative testing to confirm the condition of cables and connectors used in instrumentation circuits generating low level signals. Testing may include insulation resistance tests, time domain reflectometry tests, or other testing judged to be effective in determining cable insulation condition. The test frequency will be based on Engineering evaluation and will not exceed 10 years. The first tests will be completed prior to the period of extended operation.

Operating Experience

The non-EQ instrumentation cable monitoring program draws on the existing surveillance testing required by Technical Specifications and the corresponding operating experience. Although Millstone has not identified any age-related degradation of instrument cables, industry operating experience has shown that anomalies found during cable testing can be caused by degradation of the instrumentation circuit cable and are a possible indication of potential cable degradation.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Discrepancies Found with High-Voltage Cable and the Inner Shield of Signal Cable for a Radiation Monitor

During cable testing of a Millstone Unit 3 radiation monitor, discrepancies were found with the high-voltage cable (outer shield short to ground) and inner shield. The outer ground was cleared. A self diagnostics of the monitor was performed for the high-voltage circuitry, and the detector signal was tested with an internal detector source. Troubleshooting was performed and the results were analyzed by the System Engineer. The System Engineer determined that the circuit was actually functioning as required, and no further actions were necessary.

The Jacket on One Channel of the Linear Range Detector Cable Located in a Control Room Cabinet Was Damaged

The jacket on one Millstone Unit 2 channel of the linear range detector cable, located in a Control Room cabinet, was found damaged. The damage was noted during the shield repair of the isolation resistors. The damaged cable was replaced.

Conclusion

The *Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits* 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.

B2.1.10 FIRE PROTECTION PROGRAM

Program Description

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 program also manages the aging effects for the diesel-driven fire pump fuel supply line, the reactor coolant pump oil collection systems, and Appendix R support equipment.

The halon/carbon dioxide fire suppression system is included in the scope of the license renewal program. However, no aging effects requiring management were identified for this system.

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.

NUREG-1801 Consistency

The *Fire Protection Program* is an existing program that is consistent with the following sections of NUREG-1801, with the exception described below:

- Section XI.M26, “Fire Protection” [with exception]
- Section XI.M27, “Fire Water System” and the revised Section XI.M27, “Fire Water System” program described in NRC ISG-04 (Reference B-24). [without exception]

Exceptions to NUREG-1801

Exception 1: XI.M26 – Aging Management of the Halon and Carbon Dioxide Systems

The aging management review for the Millstone Unit 2 and Unit 3 Fire Protection Systems did not identify any aging effects requiring management for the halon and carbon dioxide systems. Therefore, the aging management requirements for the halon and carbon dioxide systems included in NUREG-1801, XI.M26 AMP are not applicable.

Program Elements Affected

- **Scope of Program**

  The NUREG-1801 program element includes management of the aging effects for the halon and carbon dioxide systems in the scope the AMP. The aging management reviews performed for the Unit 2 and Unit 3 Fire Protection Systems did not identify any aging effects requiring management for the halon and carbon dioxide systems. Therefore, the aging management requirements for the halon and carbon dioxide systems included in NUREG-1801, XI.M26 AMP are not applicable.

Enhancements

Enhancement 1: Baseline Inspection of Buried Fire Protection Piping and Components

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 8.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.M27 - Detection of Aging Effects**

  Visual inspection of Fire Protection System internals will be used for monitoring the age-related degradation of system piping and components internals.

Enhancement 2: Testing or Replacement of Fire Protection Sprinkler Heads

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 is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 9.

This enhancement will be implemented prior to the sprinkler heads achieving 50 years of service life.

Program Elements Affected

- **XI.M26 & XI.M27 - Preventive Actions**

  This program element identifies methods or techniques to ensure appropriate fire prevention measures are maintained and no significant degradation occurs. Millstone will enhance the *Fire Protection Program* to test a representative sample of fire protection sprinkler heads or replace the sprinkler heads before they achieve 50 years of service life.

- **XI.M26 & XI.M27 - Detection of Aging Effects**

  This program element identifies methods or techniques to ensure timely detection of aging effects. Millstone will enhance the *Fire Protection Program* to test a representative sample of fire protection sprinkler heads or replace the sprinkler heads before they achieve 50 years of service life.

Operating Experience

Component inspections and surveillance tests are performed in compliance with the applicable sections of the corresponding Technical Requirements Manuals and in accordance with the 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, *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.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Intake Structure Fire Seal Failed Inspection</u>

During the performance of a surveillance procedure, two intake structure fire penetration seals failed to meet the surveillance acceptance criteria. As a result, repairs to the seals were initiated in accordance with applicable seal design details and the seal repair procedure. In addition, the inspection group of penetration seals was increased by 10 percent in accordance with the Technical Requirements and no additional failures were identified.

<u>Degraded Laminate On Halon Boundary Fire Door</u>

A fire door was found to have a degraded laminate on the outside upper right hand corner. The door, identified as a non-rated, non-Technical Requirements fire door assembly, was a Halon boundary. The door and frame had been previously evaluated as acceptable. However, the door, in its potentially degraded condition, was re-evaluated. It was determined that the door would still perform its required function.

<u>Hole Found In Fire Door</u>

While performing a fire door inspection surveillance, a through penetration hole was identified. The hole, measuring approximately 6 to 8 inches in length and approximately

1/8 inch wide, was discovered between the upper west portion of the door frame and the wall. The deficiency was corrected.

Fire Water Piping Corrosion Assessment

The corrosion mechanisms seen in fire water 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 3 years, and no significant degradation in overall loop flow has been noted. Further, due to the recent permanent shutdown of Millstone Unit 1, several parts of the site’s fire water above ground piping have been removed and made available for detailed inspection.

All of the Millstone Unit 1 piping segments had been in place and filled with water for approximately 30 years. 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. No significant corrosion was identified in the above ground piping. The remainder of the above ground piping segments inspected were clean.

Since the fire pumps are run frequently, the piping associated with the pumps’ suction lines and tank recirculation lines were 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. Much of this corroded piping, and the tanks themselves, were replaced as part of the fire tank replacement project.

Conclusion

The *Fire Protection 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.

B2.1.11 FLOW-ACCELERATED CORROSION

Program Description

The *Flow-Accelerated Corrosion* program, which manages the aging effect of loss of material, is in accordance with the EPRI guidelines in NSAC-202L (Reference B-8), and includes procedures or administrative controls to assure that the structural integrity of carbon steel and low-alloy steel piping and components, such as valves, steam traps, and feedwater heaters, is maintained.

Specific procedures and methods satisfy NRC Bulletin 87-01 (Reference B-45) and NRC GL 89-08 (Reference B-7). The program predicts, detects, and monitors FAC as identified by wall thinning (loss of material) in plant piping and components. The program includes the following elements: (a) conduct an analysis to determine critical locations; (b) perform limited baseline inspections to determine the extent of thinning at these locations; and (c) perform follow-up inspections to confirm the predictions, or repair or replace components as necessary. To ensure that loss of material due to FAC is properly managed, the program uses the predictive code, CHECWORKS/FAC. The selection of components for examination is determined through the use of CHECWORKS/FAC analysis, component re-inspection, and plant and industry experience.

For steam traps and most valves, the *Work Control Process* provides opportunities to inspect these components to identify loss of material and to initiate corrective action.

NUREG-1801 Consistency

The *Flow-Accelerated Corrosion* program is an existing program that is consistent with NUREG-1801, Section XI.M17, “Flow-Accelerated Corrosion”, with the exception discussed below.

Exceptions to NUREG-1801

Exception 1: Use of NSAC-202L, Revision 1

NUREG-1801, Section XI.M17, “Flow-Accelerated Corrosion” identifies that the applicable industry guideline is NSAC-202L, Revision 2. The *Flow-Accelerated Corrosion* program is based on Revision 1 of this same guidance. The *Flow-Accelerated Corrosion* program is consistent with all guidance provided in NUREG-1801, Section XI.M17. The later revision has been reviewed and it was determined that the changes do not significantly impact the effectiveness of the *Flow-Accelerated Corrosion* program. For example, changes in Revision 2 related to high hydrazine concentrations in the secondary systems are not applicable to Millstone, which for environmental reasons, severely restricts the use of hydrazine. Therefore, the continued use of Revision 1 at Millstone is consistent with the intent of NUREG-1801, Section XI.M17 and it has been determined that a program revision to incorporate Revision 2 is not required.

<u>Program Elements Affected</u>

- **Scope of Program**

  NUREG-1801 identifies NSAC-202L, Revision 2 as the applicable industry guideline. The *Flow-Accelerated Corrosion* program is based on Revision 1 of this same guidance. The *FAC Program* is consistent with all guidance provided in NUREG-1801, Section XI.M17. The differences between the two revisions have been reviewed and do not significantly impact *Flow-Accelerated Corrosion* program effectiveness. As a result, it has been determined that a program revision to incorporate Revision 2 is not required and that the use of Revision 1 at Millstone is consistent with the intent of NUREG-1801, Section XI.M17.

Enhancements

The *Flow-Accelerated Corrosion* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M17, “Flow-Accelerated Corrosion.”

Operating Experience

Operating experience indicates that while wall thinning has occurred since implementation of the *Flow-Accelerated Corrosion* program, the FAC 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.

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 Millstone strategic chemistry plans identify that the use of ETA has been responsible for a significant reduction in FAC and feedwater iron values. Until recently, the use of ETA or other amine for further reduction in FAC and feedwater iron transport values has been limited due to restrictions associated with the use of full flow condensate polishers during operation. However, recent improvements to the resin regeneration technique and operating capacity may allow for future changes in the pH control program.

A review of previous inspection results is performed to ensure that the specific experience is included in the selection of components for examination. Systems known to be FAC susceptible, based on plant and industry experience, are considered for inclusion in the program in accordance with station procedures. The industry experience input to the *Flow-Accelerated Corrosion* program is based on information from such sources as EPRI, the CHECWORKS Users Group, Nuclear Network, and NRC Information Notices.

A rupture in the heater drain pump recirculation line at Millstone Unit 2 in 1995 resulted in the development of a new station procedure incorporating methodology to effectively solicit and integrate information obtained during the interviews with operating review personnel. The intent of this procedure is to provide the *Flow-Accelerated Corrosion* Program Manager with the necessary plant and industry operating experience to be integrated into the *Flow-Accelerated Corrosion* program. As an example of the valuable operating experience provided by this procedure, the feedback form was used to address an industry event where feedwater heater shell degradation had resulted in through-wall failure at Point Beach Unit 1. The *Flow-Accelerated Corrosion* Program review of this information resulted in performance of additional feedwater heater NDE examinations and the addition of all feedwater heaters to the FAC susceptibility screening document for future monitoring.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Flow-Accelerated Corrosion Program Identifies Two 90 Degree Elbows Below Their Minimum Wall Thickness

Flow-Accelerated Corrosion program ultrasonic examinations of feedwater system components identified two 90-degree elbows with their measured wall thickness below the minimum value allowed by the ANSI B31.1 Code. The condition was documented and the two elbows were subsequently replaced. An increased sampling of feedwater components is scheduled to be performed during the next refueling outage. Also, a parametric study was conducted using oxygen levels data supplied by the Chemistry Department and CHECWORKS. It was found that the predicted wear algorithm did not change when the oxygen parameter in CHECWORKS was below 20 ppb. However, operating experience has indicated that low oxygen levels can have an adverse impact on the system's ability to build-up a protective oxide layer, and thus the potential for iron transport and FAC increases. As a result, a procedure change is being developed to allow for oxygen to be introduced into the condensate system in order to promote the development of the protective oxide layer, thereby minimizing iron transport and FAC.

Flow-Accelerated Corrosion Program Inspection Identified Component Which Requires Replacement

During sample inspections, for small bore piping in the *FAC* program, a section of small bore piping in the Main Steam System was identified as having 70% wall loss. An engineering evaluation was performed, which concluded that the pipe wall loss was not acceptable for continued operation. The degraded pipe section was removed and replaced with chrome-moly steel pipe, in accordance with the applicable specification. The replacement material was selected because it was less susceptible to FAC-induced wear.

UT Inspection Identified Valve Body Erosion on Feedwater System Valve

During normal maintenance activities for the feedwater pump’s recirculation to condenser valve, potential valve body erosion was discovered. The *FAC* program was notified and a UT examination was performed on the valve body, which was found to have a wall thickness that was below the code-required minimum. The valve was weld repaired according to Engineering disposition and UT inspected as satisfactory. The *FAC* program established the necessary controls and schedule for the future inspections.

Conclusion

The *Flow-Accelerated Corrosion* 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.

B2.1.12 FUEL OIL CHEMISTRY

Program Description

The *Fuel Oil Chemistry* program controls 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 *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 effectiveness of the *Fuel Oil Chemistry* program is verified by the Tank Inspection Program, for in-scope tanks, 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 would evaluate the cause and extent of the condition and, if required, recommend enhancements to ensure continued effectiveness of the *Fuel Oil Chemistry.*

NUREG-1801 Consistency

The *Fuel Oil Chemistry* program is an existing program that is consistent with NUREG-1801, Section XI.M30, “Fuel Oil Chemistry”, with the exceptions discussed below.

Exceptions to NUREG-1801

Exception 1: Lack of Addition of Biocides, Stabilizers and Corrosion Inhibitors

The *Fuel Oil Chemistry* program does not include the addition of biocides, stabilizers, or corrosion inhibitors. Millstone operating experience and sample results confirm that microbiologically influenced corrosion and breakdown of the fuel oil have not been issues requiring the use of fuel oil additives.

Program Elements Affected

- **Preventive Actions**

  This program element identifies the use of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and a corrosion inhibitor to mitigate corrosion. Based on Millstone operating experience, the *Fuel Oil Chemistry* program does not require the use of fuel additives.

Exception 2: Sampling and Dewatering Frequency of Security Diesel Fuel Oil Storage Tank

NUREG-1801 specifies that water and biological activity or particulate contamination concentrations be monitored and trended at least quarterly. Sampling and testing of the fuel and dewatering of the security diesel fuel oil storage tank is performed semi-annually. This frequency is considered adequate based on operating experience and trending of sample results.

Program Elements Affected

- **Preventive Actions**

  This program element identifies that periodic draining of a fuel oil storage tank is required to minimize the amount of water in the tank and the length of time the water is in contact with the tank wall. The *Fuel Oil Chemistry* program performs dewatering of the security diesel fuel oil storage tank semi-annually, rather than on a quarterly basis.

- **Detection of Aging Effects**

  This program element recommends that periodic sampling and testing provide assurance that fuel oil contaminants are below acceptable levels. The *Fuel Oil Chemistry* program performs testing of the security diesel fuel oil storage tank semi-annually, rather than on a quarterly basis.

- **Monitoring and Trending**

  This program element recommends that water and biological activity or particulate contamination concentrations be monitored and trended at least quarterly. The *Fuel Oil Chemistry* program monitors and trends the fuel oil contaminants for the security diesel fuel oil storage tank semi-annually, rather than on a quarterly basis.

Exception 3: Use of Unmodified ASTM D 2276 Method A

NUREG-1801 specifies the use of a modified ASTM D 2276 Method A for the determination of particulate, while Millstone uses an unmodified ASTM D 2276 Method

A (3.0 µm vs. 0.8 µm filter pore size, respectively). Since the unmodified criterion is more conservative than that described in NUREG-1801, it is considered to meet the intent of the NUREG-1801 program.

Program Elements Affected

- **Parameters Monitored or Inspected**

  The *Fuel Oil Chemistry* program does not utilize the modified ASTM Standard D 2276, Method A, for determination of particulates as specified in NUREG-1801. The unmodified version is used, which is considered to be more conservative than the larger pore size in the modified version.

- **Acceptance Criteria**

  The *Fuel Oil Chemistry* program does not utilize the modified ASTM Standard D 2276, Method A, for determination of particulates as specified in NUREG-1801. The unmodified version is used. The unmodified version is considered to be more conservative since a pore size of 0.8 µm instead of 3.0 µm is used.

Exception 4: Use of Ultrasonic Testing Based on Conditions Found During Visual Inspections

NUREG-1801 states that there is a need to verify the effectiveness of the *Fuel Oil Chemistry* program to ensure that significant degradation is not occurring. NUREG-1801 states that an acceptable verification is to measure the thickness of tank bottoms. The in-scope tanks are included in the Tank Inspection Program, which provides for ultrasonic testing activities based on evaluation of the conditions found during visual inspections. This inspection activity meets the intent of the program description in NUREG-1801 in that the effectiveness of the *Fuel Oil Chemistry* program is verified by visual inspection and, if significant erosion/corrosion or degradation of the tank wall is found, UT measurement of the deteriorated area is performed.

Program Elements Affected

- **Detection of Aging Effects**

  NUREG-1801 recommends measuring the thickness of tank bottoms to verify the effectiveness of the *Fuel Oil Chemistry* program to ensure that significant degradation is not occurring. The effectiveness of the *Fuel Oil Chemistry* program is determined by the Tank Inspection Program which provides for ultrasonic testing activities based on evaluation of the conditions found during visual inspections.

Exception 5: Use of Detection Method in Lieu of Periodic Draining of Water for The Day Tanks (Millstone Unit 2 Only)

NUREG-1801 specifies that periodic draining of water collected at the bottom of a tank minimizes the amount of water and, for corrosion purposes, the length of contact time with the tank wall. The penetration for the drain in the Millstone Unit 2 emergency diesel day tanks is in the side of the tank but at a lower elevation than the supply piping penetration. As a result, water would be detected during testing before it would enter the supply piping to the emergency diesel. While the tank is not dewatered at the very bottom, the tank is inspected and cleaned as required by the Tank Inspection Program. This condition is considered acceptable based on operating experience that has verified no water present during previous tank inspections.

Program Elements Affected

- **Preventive Actions**

  This program element specifies that periodic draining of water collected at the bottom of a tank minimizes the amount of water and, for corrosion purposes, the length of contact time with the tank wall. The *Fuel Oil Chemistry* program cannot perform dewatering of the Millstone Unit 2 emergency diesel day tanks because the “bottom drain” is located in the side of the tank. The tanks are inspected and cleaned as part of the Tank Inspection Program.

Exception 6: Use of ASTM Standard D 1796, vice Standard D 2709

NUREG-1801 states that ASTM Standard D 2709 is to be used for guidance on the determination of water and sediment contamination in the diesel fuel. The Millstone 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 Millstone Units 2 and 3 and the fuel oil for both units is procured to the same specification. Consequently, station procedures reference only ASTM Standard D 1796 for this guidance. ASTM D1796 is a quantitative analysis such that more accurate results can be realized. This allows for both assessment and established limits, allowing decisions for corrective actions for be taken before an out of specification condition exists. ASTM D 2709 is a pass or fail test, or qualitative vice quantitative. Although it includes assessment criteria, it does not allow for accurate results with definitive numerical values that can be treated to assess conditions. Therefore, the use of ASTM D 1796 meets the intent of the NUREG-1801 program.

Program Elements Affected

- **Parameters Monitored or Inspected**

  ASTM D 1796 is used as the basis for determination of water and sediment contamination in the diesel fuel in lieu of ASTM Standard D 2709. Both standards identify water and sediment as the parameters to be monitored. Therefore, the *Fuel Oil Chemistry* program is consistent with the NUREG-1801, XI.M30 program.

- **Acceptance Criteria**

  The Millstone Unit 3 Technical Specifications require the use of the ASTM D 1796 criteria. ASTM D 1796 and ASTM Standard D 2709 specify similar, though not identical, acceptance criteria for water and sediment contamination in the diesel fuel. ASTM D1796 is a quantitative analysis allowing decisions for corrective actions to be taken before an out of specification condition exists. As a result, the fuel oil for Millstone Units 2 and 3 is purchased to the same specifications. The use of ASTM D 1796 is consistent with the intent of the NUREG-1801 program.

Enhancements

The *Fuel Oil Chemistry* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M30, “Fuel Oil Chemistry”.

Operating Experience

Operating experience indicates that while fuel oil deliveries from commercial vendors and tank samples do not always meet Millstone quality specifications, the *Fuel Oil Chemistry* program is 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 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. No failures of fuel oil system components have been identified at Millstone due to contamination or water induced degradation.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Fuel Oil Delivery Did Not Meet Requirements for API Gravity and Kinematic Viscosity

Upon delivery of fuel oil for use in the Unit 2 diesel fuel oil storage tank, the tank truck was sampled in accordance with station procedures. The verification analysis conducted by the offsite laboratory indicated unsatisfactory results for API gravity and kinematic viscosity. Consequently, the delivery was not accepted for use in the diesel fuel oil storage tank. A new delivery of fuel oil was initiated. As a follow-up action, a purchase order was developed for a new vendor. The quality of the fuel oil procured from the new vendor was tracked and trended to establish confidence that the vendor consistently provided a product meeting Millstone requirements. The trended information confirmed satisfactory vendor compliance.

<u>During Diesel Fuel Oil Storage Tank Dewatering, Slight Rust and Gritty Sediment Was Observed in the Effluent</u>

While performing monthly fuel oil storage tank dewatering, slight rust and gritty sediment was observed being pumped out of a Unit 3 fuel oil storage tank. Additionally, “fungi looking chunks” were observed in the opposite fuel oil storage tank effluent that disappeared as soon as it reached the roto-flex pump. Investigation revealed that the particulate resulted from rust and grit on the top of the dewatering tube and was not representative of the tank's contents as a whole. Particulate testing was also performed and, based on the results, it was believed that the particulate was not biological in nature. To confirm the results, a sample was obtained from the fuel oil storage tank and was tested for biological growth. The results confirmed the preliminary conclusion that no biological growths were present.

<u>Results of Station Blackout Diesel Storage Tank Sample Outside of Specification</u>

To establish baseline data prior to placing the fuel oil heater in service, a tank bottom sample of the station blackout diesel storage tank was drawn using the tank dewatering pump. The sample particulates exceeded the values specified in the guideline for the emergency diesel storage tank and used for the station blackout diesel storage tank. A review of the condition noted that though the sample results exceeded the guideline, they were below the generally accepted maximum limit for fuel oil particulates. A follow-up sample was conducted, resulting in a particulate level within specified limits for the emergency diesel storage tank. The investigation determined that the fuel oil was acceptable for use. Additional corrective actions implemented included modification of the sampling methodology, establishment of a particulate limit for the station blackout diesel storage tank and establishment of a 10-year preventive maintenance activity to drain and clean the station blackout diesel fuel oil storage tank.

<u>Internal Inspection of the Emergency Diesel Generator Fuel Oil Day Tanks</u>

Internal tank inspections were performed on the Millstone Unit 2 emergency diesel generator fuel oil day tanks in January 2002 as required by the *Tank Inspection Program*. These tanks have been in service since plant start up and were previously inspected in 1988. The tanks were drained, the manways opened, and residual oil on the bottom of the tank was removed. The inspection included a visual inspection of the accessible tank seam welds for cracking, distortion, corrosion or other evidence of deterioration; visual inspection of the accessible tank walls, head and bottom for cracking, distortion, corrosion pitting, or other evidence of deterioration; and visual inspection of accessible tank internal nozzles for cracking, erosion, corrosion, or other evidence of deterioration. The inspections did not discover any reportable conditions and the condition of the tank internals were described as “like new”. The tanks were closed and returned to service.

Conclusion

The *Fuel Oil Chemistry* 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.

B2.1.13 GENERAL CONDITION MONITORING

Program Description

General Condition Monitoring is an existing, plant-specific program that manages the aging effects of loss of material, cracking, and change of material properties on the external surfaces of components. The program is performed in accessible plant areas for components and structures including those within the scope of license renewal. *General Condition Monitoring* involves visual inspections for evidence of age-related degradation. Evidence of boron precipitation and active radioactive system leaks are identified during area observations made by Health Physics technicians while performing radiologically controlled area surveys. System Engineers perform comprehensive visual inspections during walkdowns of plant systems and components during both normal operation and refueling outages. Plant Equipment Operators perform equipment and structures inspections twice a day to maintain awareness of system and plant operation, and materiel conditions during normal operation and refueling outages.

Aging Management Program Elements

A comparison of the *General Condition Monitoring* to ten elements described in Appendix A of NUREG-1800 (Reference B-1) is provided below.

Scope of Program

General Condition Monitoring is performed in the following ways:

- System Engineer walkdown inspections.
- Health Physics inspections of radiologically controlled areas.
- Plant Equipment Operator walkdowns and inspections.

General Condition Monitoring detects aging effects by visual inspections of the exterior surface of plant equipment, whether it is constructed of metal, concrete, or polymers (such as sealants). An areas approach is used for monitoring the condition of plant equipment. In the areas approach, the plant is segregated into areas that contain the equipment or structure being evaluated. These areas can range from a specific area of a room, an entire room, a floor of a building or an entire building. For these areas, the plant personnel performing the *General Condition Monitoring* inspections would be looking for aging effects such as loss of material, cracking, or change of material properties.

The activities performed in the *General Condition Monitoring* program provide inspections for management of loss of material due to boric acid corrosion for those systems/areas beyond the scope of the *Boric Acid Corrosion* program.

The structural inspections are performed by individuals trained in this area and are consistent with similar inspections performed by the Structures Monitoring Program, except for frequency of inspection.

Preventive Actions

The *General Condition Monitoring* program are designated condition monitoring. No preventive actions are performed.

Parameters Monitored or Inspected

System engineer walkdown inspections monitor the materiel condition of plant systems, structures and components during normal operation, shutdown conditions and refueling outages. The following types of degradation or adverse conditions are looked for 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
- loose, corroded, stressed, seized or rusted skids, foundations, supports, hangers and fasteners

Performance of radiologically controlled area surveys by Health Physics personnel identifies evidence of boron precipitation and active radioactive system leaks.

Plant Equipment Operators perform inspections of accessible plant areas twice a day to verify acceptable component or system operation. Plant Equipment Operator rounds also monitor the materiel condition of plant systems, structures and components during all modes of operation. The following types of degradation or adverse conditions are looked for during visual inspections:

- evidence of system leakage, including evidence of boric acid
- evidence of ground water intrusion or leakage
- loose or missing pipe hangers
- evidence of degradation (e.g., excessive corrosion or scaling)
- signs of unusual concrete or grout deterioration, erosion, corrosion, chipping, cracking, or spalling of concrete structures

Detection of Aging Effects

The external condition of structures and components is determined by visual inspection. These inspections provide information to help manage the aging effects of loss of material, cracking, and change of material properties.

Visual monitoring of the structures and components in accessible 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.

Monitoring and Trending

Observations of significant degradation are identified for engineering evaluation and documented in accordance with governing procedures. Additionally, system health reports are prepared each quarter. The health report provides an engineering perspective on system conditions and provides an effective tool by which management can focus attention and resources on systems that do not meet performance goals. This report, in part, documents significantly degraded or problematic materiel conditions.

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.

Acceptance Criteria

The acceptance criterion for visual inspections is the absence of any visual indication of external degradation. Degraded conditions that are adverse to quality are entered into the Corrective Action Program.

Corrective Actions

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. Any resultant maintenance or repair activities are performed in accordance with applicable engineering requirements and the maintenance and work control procedures. The Corrective Action Program provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable. Where evaluations are performed without repair or replacement, engineering analysis provides reasonable assurance that the intended function of the structure or component is maintained consistent with the current licensing basis. The Corrective Action Program identifies repetitive discrepancies, considers the extent of the condition, and initiates additional corrective action, as appropriate, to preclude recurrence.

Confirmation Process

QA procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B.

If degradation that requires repair is identified during monitoring activities, corrective actions are implemented. Additionally, inspection results from reviews by outside organizations are used to help confirm the maintenance of plant integrity and materiel condition.

Administrative Controls

Administrative and implementing procedures are reviewed, approved, and maintained as controlled documents in accordance with the procedure control process and the Quality Assurance Program.

Operating Experience

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.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Emergency Diesel Generator Floor Drain Grout Cracked and Uneven

While doing a walkdown of one of the emergency diesel generator rooms as part of the Plant Equipment Operator daily rounds, the operator found spalled concrete around the floor drain. Subsequently, the System Engineer investigated the issue. The investigation did not identify any additional adverse conditions and direction was provided to the field for repairs. The repair of the concrete floor has been scheduled.

Refueling Water Recirculation Pump Drain Plug Leaks Boron Accumulating On Pedestal

A Health Physics technician discovered minor leakage from the refueling water recirculation pump and boron buildup on the pedestal. Leak repair and cleanup was performed. Subsequent engineering inspection showed no evidence of additional leakage and that the bolted connections were not affected.

Boron Leakage Accumulated Around Drain Plug On Volume Control Tank Pressure Relief Valve

Health Physics identified evidence of boron leakage around a drain plug on the volume control tank relief. The boric acid accumulation at the drain plug was cleaned and evaluated, and determined to not present a bolted connection concern. The repair of the drain plug is scheduled. Additionally, it was determined that there was no adverse impact to other equipment in the immediate area.

Boric Acid Discharge Sample Pipe Support Has Inadequate Clearance on Sliding Portion

During a System Engineer walkdown, it was noted that a piping support had inadequate clearance possibly due to excessive paint. The support was removed, cleaned, and re-assembled. Post-maintenance clearances were verified to be adequate.

Enhancements

Enhancement 1: Procedure and Training Enhancements

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 10.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

Detection of Aging Effects

The procedures utilized by the personnel implementing the *General Condition Monitoring* program require enhancement to provide expectations for inspections that identify the aging effects of the structures and components in-scope for license renewal. Training for the detection of aging effects for the personnel involved in *General Condition Monitoring* will be enhanced. Degradation of in-scope equipment is reported using the Corrective Action Program.

Monitoring and Trending

The procedures utilized by the personnel implementing the *General Condition Monitoring* program require enhancement to provide expectations for inspections that identify the aging effects of the structures and components in-scope for license renewal. Training for the detection of aging effects for the personnel involved in *General Condition Monitoring* will be enhanced. Degradation of in-scope equipment is reported using the Corrective Action Program.

Conclusion

The *General Condition Monitoring* 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.

B2.1.14 INACCESSIBLE MEDIUM VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

This program manages the aging effect of formation of water trees and ensures that inaccessible medium-voltage (2 kV to 15 kV) electrical cables within the scope of license renewal (but not subject to the environmental qualification requirements of 10 CFR 50.49) that have been submerged, remain capable of performing their intended function. The program considers the combined effects of submergence, simultaneous with a significant voltage exposure. Significant voltage exposure is defined as being subjected to system voltage for more the twenty-five percent of the time. The program uses periodic actions, such as pumping and inspection of cable vaults, to prevent cables from being submerged.

In the event that submerged cables subject to significant voltage are found, an engineering evaluation will be performed and the appropriate testing requirements will be specified, as necessary, to confirm the condition of the cable insulation. Any tests performed will be proven tests for detecting deterioration of the insulation due to wetting, and are acceptable to both the nuclear industry and the NRC. Examples of possible tests include power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2 (Reference B-34), or other appropriate testing.

This program considers the technical information provided in NUREG/CR-5643 (Reference B-14), IEEE Std. P1205 (Reference B-15), SAND 96-0344 (Reference B-16), and EPRI Technical Report TR-109619 (Reference B-17).

NUREG-1801 Consistency

The Millstone *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program is an existing program that is consistent with NUREG-1801, Section XI.E3, "Inaccessible Medium-Voltage Cables not Subject to 10 CFR50.49 Environmental Qualification Requirements", with the exception discussed below.

NUREG-1801 discusses the prevalence of water treeing for cables operating at 13 kV to 33 kV. The *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program defines a service voltage range of 2 kV to 15 kV. Millstone has no high-voltage cable (above 15 kV) located in areas, such as cable vaults, where the cable could become submerged, therefore the Millstone voltage range is consistent with the intent of the NUREG-1801 program.

Exceptions to NUREG-1801

Exception 1: Engineering Evaluation of Submerged Cables

The NUREG-1801, Section XI.E3 identifies that in-scope medium voltage cable having significant voltage and exposed to significant moisture (submerged) are tested to provide an indication of the condition of the conductor insulation. Should evidence of submerged medium voltage cable with significant voltage be identified, the *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program requires an engineering evaluation to determine the appropriate actions to fully address the identified condition of the cables, including the identification of testing requirements as necessary.

<u>Program Elements Affected</u>

- **Scope of Program**

  The NUREG-1801 program element identifies that in-scope medium voltage cable exposed to significant moisture (submerged) and having significant voltage are tested to provide an indication of the condition of the conductor insulation. Should evidence of submerged medium voltage cable with significant voltage be identified, 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

- **Parameters Monitored/Inspected**

  The NUREG-1801 program element identifies that in-scope medium voltage cable exposed to significant moisture (submerged) and having significant voltage are tested to provide an indication of the condition of the conductor insulation. Should evidence of submerged medium voltage cable with significant voltage be identified, 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.

- **Detection of Aging Effects**

  The NUREG-1801 program element identifies that in-scope medium voltage cable exposed to significant moisture (submerged) and having significant voltage are tested at least once every 10 years. Should evidence of submerged medium voltage cable having significant voltage be identified, Millstone Engineering will evaluate the condition 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.

Enhancements

Enhancement 1: Verification Testing

Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables having significant voltage and have 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. Examples of such tests include power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2 (Reference B-34), or other appropriate testing. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 11.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Scope of Program**

  This program element identifies the specific components subject to aging management for license renewal. The *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program will ensure that Engineering is notified. Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that are exposed to significant voltage and have 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.

- **Detection of Aging Effects**

  This program element identifies methods or techniques to ensure timely detection of aging effects. For in-scope medium-voltage cables that have significant voltage and have been submerged, the *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* program will ensure that Engineering is notified. Engineering will identify testing requirements, as necessary, to confirm the condition of the cable insulation for inaccessible medium-voltage cables that have significant voltage and have 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.

Operating Experience

Testing of non-EQ, medium-voltage cables to confirm the condition of the insulation after submergence has minimal operating experience at Millstone. The regular pumping and inspections of cable enclosures containing in-scope, medium-voltage cables have been recently established based on industry operating experience with submerged cables and the recognition of water treeing as an aging effect.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Potential Submergence of Safety-Related Cables

Industry operating experience identified examples where safety-related cables had the potential to be submerged. Initial investigation for applicability of this operating experience to Millstone determined that some electrical manholes containing safety-related medium voltage cables had the potential for potential submergence. Millstone Units 2 and 3 each identified seven manholes that were potentially susceptible to this problem.

A review indicated that the cables in the Millstone Unit 3 manholes had not been submerged.

A review of Millstone Unit 2 indicated that cables in manholes may have been submerged. The specific safety-related cables were identified and a review was conducted of the manufacturers, purchase specifications, and qualification records. The cables were inspected for degradation and none was found. Based on the inspection results and the cable design information, an engineering evaluation determined that the installed cables were acceptable for continued use.

Conclusion

The *Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements* 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.

B2.1.15 INFREQUENTLY ACCESSED AREAS INSPECTION PROGRAM

Program Description

The *Infrequently Accessed Areas Inspection Program* is a new, plant-specific program that manages the aging effects of loss of material, change of material properties, and cracking using visual inspections of the external surfaces of structures and components. 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 structures or components subject to aging management, have been identified for inclusion in the program.

A baseline inspection of structures and components in the scope of the *Infrequently Accessed Areas Inspection Program* will be performed. An engineering evaluation of the inspection results will determine whether additional inspections of structures or components in the *Infrequently Accessed Areas Inspection Program* are required.

The inspections of structures and supports performed under the *Infrequently Accessed Areas Inspection Program* are consistent with the inspections performed in the Structures Monitoring Program, except for the frequency of the inspections.

Aging Management Program Elements

A comparison of the *Infrequently Accessed Areas Inspection Program* to ten elements described in Appendix A of NUREG-1800 (Reference B-1) is provided below.

Scope of Program

Infrequently accessed areas of the plant that contain in-scope structures and components that require aging management are listed as follows:

- Millstone Unit 2 Intake Structure circulating water bays (below Intake Structure floor and above the water)
- Millstone Unit 2 bypass line (interior of the concrete pipe)
- Millstone Unit 3 Auxiliary Building heat exchanger room on 4'6" elevation
- Millstone Unit 3 service water pipe enclosure in the Control Building
- Millstone Unit 3 Intake Structure circulating water bays (below Intake Structure floor and above the water)
- Millstone Unit 3 regenerative heat exchanger room in Containment
- Millstone Unit 3 Auxiliary Building demineralizer alley (inside the cubicles)
- Millstone Unit 3 Auxiliary Building to Fuel Building pipe tunnel
- Millstone Unit 3 Containment Enclosure Building (Supplementary Leak Collection and Release System duct)
- Millstone Unit 3 Area between the reactor vessel and neutron shield tank in Containment
- Millstone Unit 3 Emergency Diesel Generator Cubicles upper level area
- Millstone Unit 3 cable spreading area, north and south electrical tunnels, tops of the switchgear rooms
- Millstone Unit 3 recirculation tempering line (interior of concrete pipe) and associated valve pit
- Millstone Stack

Preventive Actions

The inspection activities for infrequently accessed areas are designated condition monitoring. No preventive actions are performed.

Parameters Monitored or Inspected

Visual inspections of external surfaces are performed to detect degradation or adverse conditions, such as the following:

- Component leakage
- Rust or corrosion products
- Peeling, bubbling, or flaking coatings
- Indications of chemical attack
- Corroded fasteners
- Cracking of concrete, supports, and sealants
- Deformed or mispositioned piping and cable supports.

Detection of Aging Effects

The external conditions of structures and components located in the infrequently accessed areas are determined by visual inspection. These inspections detect the aging effect 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.

Monitoring and Trending

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.

Acceptance Criteria

The acceptance criterion for visual inspections will be the absence of anomalous indications that are signs of degradation. Occurrences of degradation will be entered into the Corrective Action Program, and evaluated to determine whether analysis, repair, or further inspection will be required.

Corrective Actions

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. Any resultant maintenance or repair activities are performed in accordance with applicable engineering requirements and the maintenance and work control procedures. The Corrective Action Program provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable. Where evaluations are performed without repair or replacement, engineering analysis considers reasonable assurance that the intended function of the system, structure, or component is maintained consistent with the current licensing basis. The Corrective Action Program identifies repetitive discrepancies, considers the extent of the condition, and initiates additional corrective action, as appropriate, to preclude recurrence.

Confirmation Process

QA procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B.

If degradation that requires repair is identified during monitoring activities, corrective actions are implemented. Additionally, inspection results from reviews by outside organizations are used to help confirm the maintenance of plant integrity and materiel condition.

Administrative Controls

Administrative and implementing procedures are reviewed, approved, and maintained as controlled documents in accordance with the procedure control process and the Quality Assurance Program.

Operating Experience

The *Infrequently Accessed Areas Inspection Program* is a new program, no operating experience associated with this program is available.

Enhancements

The *Infrequently Accessed Areas Inspection Program* in a new, plant specific program.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 12.

Conclusion

The *Infrequently Accessed Areas Inspection Program* ensures that the effects of aging associated with the in-scope structures and 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.

B2.1.16 INSERVICE INSPECTION PROGRAM: CONTAINMENT INSPECTIONS

Program Description

The *Inservice Inspection Program: Containment Inspections* manages the aging effects of change of material properties, cracking, and loss of material. The program is consistent with ASME Section XI, Subsections IWE and IWL, and 10 CFR 50.55a(b)(2), which provide the criteria for ISI containment inspections. IWE specifies the examination requirements for steel containments (Class MC) and the steel liners of concrete containments (Class CC) including their integral attachments. IWL specifies the examination requirements for reinforced and prestressed concrete containments (Class CC).

The scope of IWE and IWL examinations includes the surface areas and components identified in IWE-1231 and IWL-1210. Exempted or inaccessible areas as allowed by IWE/IWL are specifically identified by the program.

For Millstone Unit 2, the prestressed, post-tensioned concrete Containment is assessed per the examination requirements of ASME Section XI, Subsection IWL, Examination Category L-B for unbonded post-tensioning systems. Examination requirements similar to those specified in Subsection IWL are also identified in Technical Specifications in order to meet the requirements of Regulatory Guide 1.35.

Appendix J Leakage Rate Testing is included as part of the *Inservice Inspection Program: Containment Inspections*. The Containment Appendix J Leakage Rate Test Program implements Type A tests to measure the overall primary Containment integrated leakage rate (ILRT).

NUREG-1801 Consistency

The *Inservice Inspection Program: Containment Inspections* is an existing program that is consistent with the Time-Limited Aging Analysis (TLAA) of the Aging Management Program described in NUREG-1801, Section X.S1 “Concrete Containment Tendon Prestress,” and is consistent with the following aging management programs described in NUREG-1801, with the exceptions discussed below:

- Section XI.S1, “ASME Section XI, Subsection IWE”
- Section XI.S2, “ASME Section XI, Subsection IWL”
- Section XI.S4, “10 CFR Part 50, Appendix J.”

For Millstone Unit 2, NUREG-1801, Section XI.S2, program element “Monitoring and Trending” identifies that one tendon of each type is to be selected from the first-year inspection sample and designated as a common tendon. The requirement for designation of a common tendon did not exist in Regulatory Guide 1.35 (Reference

B-25) when the initial structural integrity test was completed for Millstone Unit 2. Tendons were randomly selected and designated as the common tendons during the first tendon surveillance performed after this requirement was added to the Regulatory Guide, and ostensively became the “first-year” inspection sample.

Exceptions to NUREG-1801

Exception 1: XI.S1 & XI.S2 - ASME Code Edition Applicability

NUREG-1801, Sections XI.S1 & 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 Millstone IWE/IWL Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no addenda. Significant changes have been made to Subsections IWE/IWL between these respective Code Editions. The most significant differences between the 1998 Edition and earlier code years are summarized as follows:

- Some of the IWE Examination Categories have been combined, and the number of IWE Examination Categories has been reduced from seven to two (E-A and E-C).
- Table IWE-3410-1 has been eliminated, and the corresponding acceptance criteria have been replaced with a requirement for the owner to define the acceptance criteria for visual examination of containment surfaces.
- Visual examinations are identified in terms of “general visual” and “detailed visual” examinations, in lieu of visual VT-1(C), VT-3(C), and surface examinations.
- Flaws or areas of degradation or repair that remain essentially unchanged during the next inspection period no longer require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C.
- 100% of accessible areas are inspected (except as exempted in accordance with Section XI).
- The IWE category for gaskets and seals no longer exists, but moisture barriers have been retained as items requiring inspection.

Although such differences exist between code years, the Millstone IWE/IWL ISI Program complies with an Edition of ASME Section XI approved by the NRC for use at Millstone Station. Implementation to this later code edition meets the intent of the NUREG-1801 descriptions.

<u>Program Elements Affected</u>

- **XI.S1 & XI.S2 - Scope of Program**

  The NUREG-1801 program element identifies both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions of

ASME Section XI, as approved in 10 CFR 50.55a. The Millstone IWE/IWL Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no addenda.

- **XI.S1 - Parameters Monitored or Inspected**

The NUREG-1801 program element identifies the use of VT-1 and VT-3 visual examinations as the primary ISI method specified in ASME XI, Subsection IWE. The Millstone IWE/IWL Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no addenda which uses “detailed visual” examinations, in lieu of VT-1 and VT-3 visual examinations.

The NUREG-1801 program element specifies seven categories for examination in accordance with Table IWE-2500-1. The first six examination categories (E-A through E-G) constitute the ISI requirements for IWE. The seventh (E-P) references 10 CFR 50, Appendix J leak rate testing. The Millstone IWE/IWL Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this later edition, the following requirements in the IWE-2500-1 Table provided in the program element have changed:

- Some of the seven IWE Examination Categories have been combined, and the number of categories has been reduced from seven to two (E-A and E-C).
- The IWE category for gaskets and seals (E-D) no longer exists, but moisture barriers have been retained as items requiring inspection.
- ”Detailed visual” examinations are used in lieu of the specified visual VT-1 and VT-3 examinations.
- Category E-P for Appendix J Containment Leakage Rate Testing was removed. However, the 1998 Edition still invokes the requirements of Appendix J for Class MC and CC components under Article IWE-5000, System Pressure Tests.

In accordance with this NUREG-1801 program element, Table IWE-2500-1 references the applicable section in Subarticle IWE-3500 for identification of the aging effects to be evaluated. Using Examination Categories E-A and E-D as examples, this program element cites the potential aging effects that may be encountered when visually inspecting containment surfaces. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this later edition, specific acceptance criteria are replaced with a requirement for the owner to define acceptance criteria for visual examination of containment surfaces.

- **XI.S1 - Detection of Aging Effects**

Regarding the extent of examination, this NUREG-1801 program element identifies that all accessible surfaces receive a visual examination such as a General Visual, VT-1, or VT-3. Also, for augmented examinations (Examination Category E-C), this program element identifies that a VT-1 visual examination is performed for areas accessible from both sides. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this edition, “detailed visual” examinations are performed in lieu of the specified visual VT-1 and VT-3 examinations, respectively.

- **XI.S2 - Detection of Aging Effects**

This NUREG-1801 program element identifies the use of VT-3C, VT-1, and VT-1C visual examinations as the applicable visual inspection methods under Subsection IWL. This program element is impacted because the visual inspections involve methods or techniques for ensuring the timely detection of aging effects. In accordance with ASME Section XI, 1998 Edition, no addenda, the Millstone IWE/IWL inservice inspection program uses “detailed visual” examinations, in lieu of VT-3C, VT-1, and VT-1C visual examinations.

- **XI.S1 - Monitoring and Trending**

As stated in this NUREG-1801 program element, IWE-2430 specifies expansion of the inspection scope when degradation exceeding the acceptance criteria is found. In accordance with the Millstone IWE/IWL inservice inspection program, 100% of accessible areas are already being inspected each inspection interval under Inspection Program B (except as exempted in accordance with Section XI).

In accordance with this program element, flaws, degradation, or repairs that remain essentially unchanged for three consecutive inspection periods, no longer require augmented examination in accordance with Examination Category E-C. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this edition, flaws or areas of degradation or repair that remain essentially unchanged during the next inspection period no longer require augmented examination in accordance with Examination Category E-C.

- **XI.S1 - Acceptance Criteria**

In accordance with this NUREG-1801 program element, IWE-3000 provides the criteria for components of steel containments and liners of concrete containments. A reference is made to Table IWE-3410-1 for the established criteria, including in some cases, numerical values for acceptance standards. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this edition, Table IWE-3410-1 (including the corresponding acceptance criteria) has been replaced with a requirement for the owner to define the acceptance criteria for visual examination of containment surfaces.

- **XI.S1 - Corrective Actions**

  This program element references Table IWE-3410-1 for identification of acceptance standards. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this edition, the owner defines the acceptance criteria for visual examination of Containment surfaces.

- **XI.S1 - Confirmation Process**

  This NUREG-1801 program element specifies that repairs must meet the criteria established in Table IWE-3410-1. The Millstone IWE/IWL inservice inspection program complies with ASME Section XI, 1998 Edition with no addenda. In accordance with this edition, the owner defines the acceptance criteria for visual examination of containment surfaces.

Exception 2: XI.S4 - Leak Rate Testing

The NUREG-1801, Section XI.S4 discusses 10CFR50 Appendix J, Type A Integrated Leak Rate Testing (ILRT), as well as Type B and C Local Leak Rate Testing (LLRTs). The *Inservice Inspection Program: Containment Inspections* credits only the Type A integrated leak rate testing to manage the effects of aging identified in the NUREG-1801 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 CFR50, Appendix J. The *Inservice Inspection Program: Containment Inspections* utilizes only the Type A integrated leak rate testing to manage the effects of aging.

Enhancements

The *Inservice Inspection Program: Containment Inspections* does not require enhancement to be consistent with the following aging management programs described in NUREG-1801:

- Section X.S1, “Concrete Containment Tendon Prestress”,
- Section XI.S1, “ASME Section XI, Subsection IWE”,
- Section XI.S2, “ASME Section XI, Subsection IWL”, and
- Section XI.S4, “10 CFR Part 50, Appendix J.”

Operating Experience

Operating experience indicates that the inspection and corrective action activities have successfully maintained the integrity of components within the scope of Inservice Inspection. A program to comply with the inspection requirements of ASME Section XI, Subsections IWE and IWL, is in place at Millstone. The formal Containment ISI Program is relatively new, with the baseline, first period inspections and examinations having been completed during Unit 2 2000 and Unit 3 2001 refueling outages. Previously, the Containment structure was being monitored as part of the *Structures Monitoring Program*. Any degradation of the Containment that was found during inspections has been noted and corrected, as necessary, to preclude adverse effects on plant safety and operability.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Update on Recent Issues Identified at Millstone Unit 2

Groundwater issues were identified and documented for Millstone Unit 2 during the 1996 building structure visual examination. Additionally, during the NRC Maintenance Rule Inspection, an open item was identified and documented regarding the long term effects of water intrusion on Containment structure rebar and the Containment liner.

During the investigation, experts were consulted to determine potential rebar, liner, and concrete damage. A vendor was chosen to perform non-destructive tests and detailed visual inspections. The inspections were reviewed with the NRC Structures Lead and determined to be acceptable. A report was received from the vendor documenting the condition of the anchor plate, liner, and concrete. This report was based on torque checks of anchor plates, ultrasonic testing of the Containment liner, and overall visual inspections inside and outside Containment. There was no indication of abnormal deterioration and no further actions were required.

Significant progress continues to be made in correcting materiel condition and structural deficiencies. The Maintenance Rule Program has identified peeling paint, corrosion, efflorescence (on ceiling, floor and walls), and ground water intrusion in the Containment tendon gallery. Repairs have been tracked with automated work orders. Containment structural integrity was determined to be acceptable in 1998, and since that time the condition of the tendon gallery has improved. The water intrusion has decreased. The structural condition remains acceptable.

Millstone Unit 2 Containment Post-Tensioning System

The inspection report of the 25th year physical surveillance of Millstone Unit 2 Containment post-tensioning included the results of the tendon surveillance examinations and tests. The report identified that the losses in tendon forces were less than expected for a plant of this age, and concluded that the Containment structure has experienced no abnormal degradation of the post tensioning system. A regression analysis of the tendon forces, which predicts that the values will remain above minimum design requirements well beyond the next surveillance interval, is included in the report.

Conclusion

The *Inservice Inspection Program: Containment Inspections* ensures that the effects of aging associated with the in-scope structures and supports 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.

B2.1.17 INSERVICE INSPECTION PROGRAM: REACTOR VESSEL INTERNALS

Program Description

This program manages the effects of aging for those reactor internals that are susceptible to loss of material, cracking, loss of pre-load, change in dimension and loss of fracture toughness (which presents itself as cracking due to embrittlement). The *ISI Program: Reactor Vessel Internals* addresses those reactor vessel internal subcomponents that support the intended function of the reactor vessel in a passive manner. The scope includes stainless steel and nickel-based alloy subcomponents susceptible to SCC, IASCC, PWSCC, void swelling, fretting wear, stress relaxation, and neutron irradiation embrittlement. Reactor vessel internals made from CASS are included in the program and additionally are susceptible to thermal aging embrittlement. The inclusion of CASS precludes the need for susceptibility screening (based on casting method, molydenum content, and ferrite content) to determine applicability of the identified aging mechanisms. The components that comprise the reactor internals 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 include (1) 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 (2) augmented examinations not required by ASME Section XI.

NUREG-1801 Consistency

The *ISI Program: Reactor Vessel Internals* is an existing program that is consistent with the following aging management programs described in NUREG-1801, with the exceptions discussed below:

- Section XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"
- Section XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"
- Section XI.M16, "PWR Vessel Internals."

In general, the NUREG-1801 AMPs credit the primary system Chemistry Control Program and the ASME Section XI, Subsection IWB, Category B-N-3 Inservice Inspections to manage aging effects in the reactor vessel internals. If future industry developments support the need for additional examinations during the period of extended operation, these examinations will be added to the respective inservice inspection plans as noted in the below exceptions.

Exceptions to NUREG-1801

Exception 1: XI.M12, XI.M13, and XI.M16 - Use of supplemental examinations in addition to the ISI program

NUREG-1801 considers the ISI program to be inadequate to monitor certain indicators of aging, and proposes supplemental examinations such as enhanced VT-1 visual examinations or enhanced ultrasonic testing. The primary area of concern involves cracking and the loss of fracture toughness due to IASCC, neutron irradiation embrittlement or thermal aging effects for reactor vessel internals. Experience has shown that current ISI techniques (e.g. VT-3 visual for Category B-N-3 from Table IWB-2500-1) will not detect all age-related degradation of the reactor vessel internals. In cases such as the baffle and former assembly bolting, cracking typically is located at the junction of the bolt shank and head and is, therefore, not directly visible.

The EPRI Materials Research Project - Reactor Internals Issue Task Group and the Westinghouse Owners Group are currently addressing the issues of change in dimensions, loss of fracture toughness, cracking, and, for baffle and former assembly bolts, the loss of pre-load. The issue of the loss of pre-load for baffle and former assembly bolts is applicable to Millstone Unit 3 only.

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), and stress corrosion cracking (PWSCC and IASCC) and will implement the appropriate recommendations resulting from this guidance.

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 13.

Program Elements Affected

- **XI.M12 - Scope of Program**

  The NUREG-1801 program element identifies that aging management is accomplished for potentially susceptible components through an enhanced volumetric examination method, or by performance of a plant-specific or component-specific flaw tolerance evaluation. In lieu of an enhanced volumetric examination method, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance

- **XI.M13 - Scope of Program**

  The NUREG-1801 program element identifies that aging management is accomplished for vessel internals through supplemental inspections based on the neutron fluence to which the component has been exposed as part of the *ISI Program: Reactor Vessel Internals*. Program element, “Detection of Aging Effects,” provides specific recommendations for types of supplemental inspections. For affected components, a supplemental examination method, or a plant-specific or component-specific flaw tolerance evaluation is performed. In lieu of the supplemental examination methods specifically recommended by NUREG-1801, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

- **XI.M16 - Scope of Program**

  The NUREG-1801 program element identifies that appropriate inspection techniques may include enhancing visual VT-1 examinations for non-bolted components and using demonstrated acceptance inspection methods for bolted connections. In lieu of the specific examination methods identified in the NUREG-1801, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

- **XI.M12 - Parameters Monitored/Inspected**

  The NUREG-1801 program element identifies that aging management is accomplished for potentially susceptible components through an enhanced volumetric examination method to detect and size cracks, or by performance of a plant-specific or component-specific flaw tolerance evaluation. In lieu of an enhanced volumetric examination method, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

- **XI.M13 - Parameters Monitored/Inspected**

  The NUREG-1801 program element identifies that aging management is accomplished for vessel internals through supplemental inspections based on the neutron fluence to which the component has been exposed as part of the *ISI Program: Reactor Vessel Internals*. Program element, “Detection of Aging Effects,” provides specific recommendations for types of supplemental inspections. For affected components, a supplemental examination method, or a plant-specific or component-specific flaw tolerance evaluation is performed. In lieu of the supplemental examination methods specifically recommended by NUREG-1801, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

- **XI.M16 - Parameters Monitored/Inspected**

  The NUREG-1801 program element identifies that more stringent inspections (than the visual VT-3 required by ASME Section XI) are recommended for vessel internals. These inspections include enhanced VT-1 examinations, or ultrasonic examinations as an applicable volumetric method. VT-1 examinations should include the ability to achieve a 0.0005-inch resolution. For bolted components, augmented ISI should include other demonstrated acceptance inspection methods to detect cracks between the bolt head and the shank. In lieu of the specific examination methods identified in NUREG-1801, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

- **XI.M13 - Detection of Aging Effects**

  The NUREG-1801 program element identifies that aging management is accomplished for vessel internals through supplemental inspections such as enhancement of visual VT-1 examinations. VT-1 examinations should include the ability to achieve a 0.0005-inch resolution. For affected components, a supplemental examination method or a plant-specific or component-specific flaw tolerance evaluation is performed. In lieu of an enhanced visual examination method, Millstone is following industry efforts to determine the necessary steps for managing age-related degradation of potentially susceptible components and will implement the appropriate recommendations resulting from this guidance.

Exception 2: XI.M16 - Use of ASME Section XI, 1989 Edition With No Addenda

Millstone Units 2 and 3 comply with ASME Section XI, 1989 Edition with no addenda. The NUREG-1801, Section XI.M16 program is based in part on an Inservice Inspection program that complies with the 1995 Edition of the Code through the 1996 addenda. However, both the 1989 Edition and the later code year and addenda referenced in NUREG-1801 identify visual VT-3 as the applicable ASME Section XI examination requirements for Category B-N-3 PWR internals.

Program Elements Affected

- **Scope of Program**

  As noted Millstone Units 2 and 3 comply with ASME Section XI, 1989 Edition with no addenda. A review of inspection requirements specified in this edition of the ASME Code versus the 1995 Edition of the Code through the 1996 addenda specified in NUREG-1801 indicates that the requirements for Category B-N-3 are the same; therefore, the Millstone program is consistent with the NUREG-1801 program.

Enhancements

Enhancement 1: Core Barrel Holddown Spring Augmented Inspection (Millstone Unit 3 Only)

Augmented inspection of the Millstone 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. This is a Millstone Unit 3 Only commitment and does not appear in the Millstone Unit 2 LRA.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.M16 - Scope of Program**

  The NUREG-1801 program element identifies the specific components subject to aging management for license renewal. Augmented inspections of the Millstone Unit 3 core barrel holddown spring will be performed.

- **XI.M16 - Detection of Aging Effects**

  The NUREG-1801 program element identifies methods or techniques to ensure timely detection of aging effects. The *ISI Program: Reactor Vessel Internals* will incorporate revised surveillance techniques to detect gross indication of loss of preload as an aging effect for the Millstone Unit 3 core barrel holddown spring.

Operating Experience

Millstone Unit 2 is currently in its third 10-year interval. Examinations of the reactor vessel internals were completed as part of the second ten-year interval. One issue (not related to age degradation) was identified during these examinations. The misalignment of one of four core barrel alignment keys was identified. Combustion Engineering was consulted, and it was determined that the alignment key would still be able to properly perform its aligning function during installation and operation without repositioning.

Millstone Unit 3 is currently in its second 10-year interval. Examinations of reactor vessel internals were completed as part of the first ten-year interval with no aging-related degradation identified as part of these examinations.

Conclusion

The *ISI Program: Reactor Vessel Internals* 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.

B2.1.18 INSERVICE INSPECTION PROGRAM: SYSTEMS, COMPONENTS AND SUPPORTS

Program Description

The *Inservice Inspection Program: Systems, Components and Supports* 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 for 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 only Class 1 and specific Class 2 components (on the secondary side of the steam generators as determined through the aging management review process) and for Class 1, 2, and 3 components supports. *ISI Program: Systems, Components, & Supports* manages the aging effects of cracking, loss of fracture toughness, loss of material, and loss of pre-load.

The *ISI Program: Systems, Components, & Supports* addresses the inservice inspection requirements for reactor vessel closure bolting, including a) inservice inspection to detect aging effects and b) preventive measures of Regulatory Guide 1.65 (Reference B-11) to mitigate cracking.

ISG-12 (Reference B-43) has been issued to address cracking of small-bore Class 1 piping as a result of thermal fatigue or SCC. The ISG identifies that for plants that have not experienced cracking of small-bore Class 1 piping, a one-time inspection is an acceptable method for confirming 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 inspection may be necessary as a plant-specific AMP. Although cracking of small-bore Class 1 piping from thermal fatigue or SCC has not been a problem, Millstone Units 2 and 3 have included small-bore piping in the RI-ISI programs. Based on risk significance (determined by an evaluation of the consequence of failure) and on the probability of failure; volumetric, surface, or VT-2 visual examinations may be performed for specific small-bore pipe welds and base metal areas as defined in the respective 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 in place whose objectives include the investigation of aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identification of appropriate aging management activities.

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, Table A6.0-1 License Renewal Commitments, Item 14.

In accordance with NUREG-1801, Section XI.M12, the potential for thermal aging embrittlement of CASS components is addressed through the performance of plant-specific or component-specific evaluations to assess whether the material has adequate fracture toughness.

As a result of NRC Bulletin 88-09, *Thimble Tube Thinning in Westinghouse Reactors*, Millstone Unit 3 actively manages incore thimble tube degradation through performance of eddy current testing during each refueling outage.

The ASME Class 2 and Class 3 components, which 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 ISI program. However, Millstone has opted to use other appropriate preventative and condition monitoring programs, such as General Condition Monitoring, to manage the effects of aging for these components.

NUREG-1801 Consistency

The *ISI Program: Systems, Components, & Supports* is an existing program that is consistent with the following NUREG-1801 program descriptions with the exceptions described below:

- Section XI.M1, “ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD” [consistent with exception]
- Section XI.M3, “Reactor Head Closure Studs” [consistent with exception]
- Section XI.M11, “Ni-Alloy Nozzles and Penetrations” [consistent with exception]
- Section XI.M12, “Thermal Aging Embrittlement of Cast Austentic Stainless Steel (CASS)” [consistent without exception]
- Section XI.S3, “ASME Section XI, Subsection IWF.” [consistent without exception]

For reactor vessel head closure stud aging management, Millstone Unit 2 complies with ASME Section XI, 1989 Edition with no addenda. NUREG-1801, Section 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. Based upon this later code year and addenda, the NUREG-1801, Section XI.M3 description identifies a VT-1 visual examination on the surfaces of closure head nuts. In accordance with the requirements of the 1989 Code Edition, a surface examination (e.g. magnetic particle, or liquid penetrant) is required. Although Millstone Unit 2 complies with the 1989 Edition of the Code, relief was granted from performing the surface examination of the nuts as required by the 1989 Edition (Reference B-35). Instead, a visual examination is performed as allowed by later Code editions and Section XI.M3. Thus, Millstone Unit 2 employs the same examination method for closure head nuts as is identified in NUREG-1801, Section XI.M3.

NUREG 1801, Section XI.M12 indicates that only surface examinations are required for valve bodies of less than 4 inches NPS (ISI Category B-M-1). Millstone Units 2 and 3 do not have any components applicable to this ISI Category.

NUREG-1801, Section XI.S3 identifies specific percentages of Class 1, 2, and 3 IWF supports that must be examined each inspection interval as required by the 1989 Edition (used at Millstone) and establishes different percentages as required by later code years (starting with the 1990 addenda to the 1989 Edition). As a clarification, in comparison to Section XI.S3, the percentages of Millstone Units 2 and 3 IWF supports examined are based on ASME Code Case N-491 (Table-2500-1), which establishes the same percentages as those of later code years that are recognized as acceptable in NUREG-1801.

Exceptions to NUREG-1801

Exception 1: XI.M1 -- Risk-Informed Inservice Inspection

NUREG-1801, Section XI.M1 does not currently recognize RI-ISI programs as an alternative to the current ASME Section XI inservice inspection requirements. Millstone Unit 2 has submitted a request to implement RI-ISI (Reference B-42). Millstone Unit 3 has received approval from the NRC to implement an RI-ISI program (Reference B-22). The RI-ISI program inspects specific Class 1 piping (including piping exempt from current requirements) on a risk informed basis. The RI-ISI program is only applicable to the nondestructive examination (NDE) requirements for ASME Section XI Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations.[1] 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 current requirements. The primary basis for the risk reduction is that examinations will be required for highly safety-significant piping segments, which are not currently inspected per the existing ASME Section XI Program. The reduction in risk and NRC approval of the RI-ISI program for Unit 3 provides sufficient justification for exception to NUREG-1801.

Program Elements Affected

- **Scope of Program**

  The NUREG-1801 program element does not recognize risk informed ISI programs as an acceptable alternative to conventional ISI. As discussed above, Millstone Unit 2 has requested NRC approval and Millstone Unit 3 has received NRC approval for an RI-ISI program.

- **Parameters Monitored/Inspected**

  This program element refers to ASME Section XI, Table IWB-2500-1 for the identification of examination and inspection requirements for Class 1 Components. For the Millstone Units 2 & 3 Class 1 Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations, inspection and examination requirements have been developed on a component-specific, risk-informed basis as part of an integrated approach for risk informed analyses.[2]

- **Detection of Aging Effects**

  This program element identifies that the examination methods are based on the requirements in ASME Section XI, Table IWB-2500-1 for Class 1 components. For the Millstone Units 2 & 3 Class 1 Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations, examination methods have been developed on

1. The RI-ISI analysis performed at Millstone Unit 2 identified no base metal locations that were considered to be potentially susceptible to thermal fatigue.
2. The RI-ISI analysis performed at Millstone Unit 2 identified no base metal locations that were considered to be potentially susceptible to thermal fatigue.

component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses.[1]

This program element identifies specific types of examinations required for Category B-F (pressure retaining dissimilar metal welds) and B-J (pressure retaining welds in piping). Examination types are based on surface location (i.e. inside or outside diameter), pipe size (i.e. 4 inch NPS or larger, less than 4 inch NPS) and types of weld (e.g. butt weld, socket weld, longitudinal, etc.). For the Millstone Units 2 & 3 Class 1 Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations, the selection of examination types has been developed on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses.[1]

- **Monitoring and Trending**

  This program element identifies that the inspection extent and frequency are based on IWB-2500, which provides for timely detection of degradation. For the Millstone Units 2 & 3 Class 1 Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations, inspection extent and frequency are determined on a component-specific, risk-informed basis as part of an integrated approach for risk-informed analyses for timely detection of degradation.[1]

  This program element also identifies that indications during examination which exceed acceptance standards are to be extended to include additional examinations in accordance with IWB-2430 for Class 1 components. For the Millstone Units 2 & 3 Class 1 Examination Category B-F and B-J type welds and, for Unit 3 only, base metal locations, the additional examinations are determined on a risk-informed basis as part of an integrated approach for risk informed inservice inspection.[1]

Exception 2: XI.M1 -- Applicability to ASME Section XI, Class 1, 2, and 3 components

The NUREG-1801, Section XI.M1 program description indicates the program is applicable to ASME Section XI, Class 1, 2, and 3 components. For license renewal, however, the *ISI Program: Systems, Components, & Supports* has been credited to manage 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 aging management review process). The inservice inspection of the remaining Class 2 and Class 3 components has not been credited for license renewal. The components will continue to be inspected during the period of extended operation as part of the CLB. Dominion has opted to use other appropriate preventative and condition monitoring programs to manage the effects of aging for these components.

1. The RI-ISI analysis performed at Millstone Unit 2 identified no base metal locations that were considered to be potentially susceptible to thermal fatigue

Program Elements Affected

Each of the ten program elements in NUREG-1801, Section XI.M1 except Confirmation Process and Administrative Controls specifically identify that the program is applicable to Class 1, 2, and 3 components, respectively. For license renewal the *ISI Program: Systems, Components, & Supports* has been credited to manage 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 aging management review process.

Exception 3: XI.M3 -- Reactor Head Closure Stud Surface Examination (Millstone Unit 3 Only)

Millstone Unit 3 complies with ASME Section XI, 1989 Edition with no addenda. NUREG-1801, Section 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. Based upon this later code year and addenda, the NUREG program description identifies a visual VT-1 examination on the surfaces of closure head nuts. 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 Code Edition. Although different than the type of examination identified in the NUREG-1801 program description, the surface examination performed at Millstone Unit 3 is more comprehensive than the visual examination allowed by NUREG-1801 and complies with the required Code Edition.

Program Elements Affected

- **Scope of Program**

  This program element describes a Reactor Head Closure Stud program that is based upon the 1995 Edition of the Code through the 1996 addenda. Millstone Unit 3 complies with ASME Section XI, 1989 Edition with no addenda.

- **Detection of Aging Effects**

  For examination Category B-G-1 (pressure-retaining bolting greater than 2 inches in diameter in reactor vessels), this program element identifies a visual VT-1 examination on the surfaces of closure head nuts. 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 Code Edition.

Exception 4: XI.M3 -- Reactor Vessel Closure Nuts And Washers Materials (Millstone Unit 2 Only)

For the reactor vessel closure studs at Millstone Unit 2, both the material grade and coating identified in plant drawings are consistent with Regulatory Guide 1.65

recommendations. The material requirements for the corresponding nuts and washers are basically consistent with the Regulatory Guide recommendations with the exception that ASTM A540, Grade B-23 is the design requirement in lieu of the ASME SA540, Grade B-23 material identified in Regulatory Guide 1.65. These specifications are identical in that they identify the same material with identical chemical and physical properties.

Program Elements Affected

- **Scope of Program**

  This program element describes the use of preventive measures of Regulatory Guide 1.65 to mitigate cracking, including the use of ASME SA540, Grade B-23 material for reactor vessel closure nuts and washers. The design requirement for vessel closure nuts and washers at Millstone Unit 2 is ASTM A540, Grade B-23.

- **Corrective Actions**

  This program element identifies that repair and replacements are in conformance with the material guidance of Regulatory Guide 1.65, which in turn specifies the use of ASME SA540, Grade B-23 material for reactor vessel closure nuts and washers. The design requirement for vessel closure nuts and washers at Millstone Unit 2 is ASTM A540, Grade B-23.

Exception 5: XI.M11 -- ASME Code Edition and Addenda

NUREG-1801, Section XI.M11 identifies ISI inspection requirements in accordance with Table IWB-2500-1 and the 1995 Edition through the 1996 Addenda of ASME Section XI. The Millstone *ISI Program: Systems, Components, & Supports* is based on the 1989 Edition with no addenda. With the issuance of the 1995 Edition of the ASME Code, examination Category B-E is included under examination category B-P. In both code years, the same examination method (i.e., VT-2 visual examination in conjunction with a pressure test) is required for the reactor vessel penetrations.

Program Elements Affected

- **Scope of Program**

  NUREG-1801, Section XI.M11 identifies ISI inspection requirements in accordance with the 1995 Edition through the 1996 Addenda of ASME Section XI. The Millstone ISI Program is based on the 1989 Edition with no addenda.

Exception 6: XI.M11 -- Reactor Vessel Top Head Inspections

NUREG-1801, Section XI.M11 references the development of an industry wide integrated, long-term, inspection program based on industry responses to Generic Letter 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 which better characterizes and addresses this PWSCC issue. In response to the more recent staff guidance such as NRC Bulletins 2002-01 (Reference B-21) and 2002-02 (Reference B-23), Millstone Units 2 and 3 have performed vessel top head examinations during their most recent refueling outages to assess the overall condition of the vessel heads. These inspections are further discussed in the Operating Experience section of this program description.

Program Elements Affected

- **Scope of Program**

  This program element discusses the use of an industry wide integrated, long-term, inspection program based on industry responses to Generic Letter 97-01 as contained in NEI correspondence. The Millstone program has additionally incorporated the more recent staff guidance on this issue, such as NRC Bulletins 2002-01 and 2002-02.

- **Detection of Aging Effects**

  This program element discusses following the recommendations of NRC GL 97-01 for performance of PWSCC susceptibility assessment and enhanced leakage detection related activities. The Millstone program has additionally incorporated the more recent staff guidance on this issue, such as NRC Bulletins 2002-01 and 2002-02.

- **Monitoring and Trending**

  This program element identifies the use of an integrated inspection program based on an NRC GL 97-01 susceptibility assessment. The Millstone integrated inspection program has additionally incorporated the more recent staff guidance on the PWSCC issue, such as NRC Bulletins 2002-01 and 2002-02.

Enhancements

The *ISI Program: Systems, Components, & Supports* does not require enhancement to be consistent with the following NUREG-1801 programs:

- Section XI.M1, “ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD”
- Section XI.M3, “Reactor Head Closure Studs”
- Section XI.M11, “Ni-Alloy Nozzles and Penetrations”
- Section XI.M12, “Thermal Aging Embrittlement of Cast Austentic Stainless Steel (CASS)”
- Section XI.S3, “ASME Section XI, Subsection IWF.”

Operating Experience

Reactor Vessel Head Examinations

As a result of on-going industry vessel head issues and issuance of NRC Bulletin 2002-01, examinations of the reactor vessel heads and penetrations have been performed during the subsequent refueling outages for Millstone Units 2 and 3. Because the Davis-Besse plant had identified severe degradation during their vessel head ultrasonic examinations, the vessel head examinations at Millstone Units 2 and 3 have been performed to ensure that similar degradation does not exist.

Millstone Unit 2 Reactor Vessel Head Examinations

During the 2002 Millstone Unit 2 refueling outage, an evaluation was performed of the reactor vessel head's overall condition. A thorough visual examination of all exposed external surfaces above the head was performed for evidence of boron leakage. The perimeter and seams of the head insulation were specifically scrutinized for signs of boric acid coming out from under the insulation or evidence of leakage from above.

An ultrasonic examination was conducted on all of the reactor vessel head penetration nozzles. The examination was performed to identify any discontinuities contained within the volume of the tube material and to detect any evidence of leakage between the external Alloy 600 nozzle surface and the low-alloy steel vessel head penetration's internal surface above the pressure boundary J-groove weld. Ultrasonic examination of this interference fit area also provided a reliable verification of the condition for the low-alloy steel adjacent to the nozzles. Additional ultrasonic longitudinal wave scanning of the vessel head from the clad surface underside in selected areas provided additional assurance that this material is in sound condition.

Liquid penetrant examinations were performed on all of the nozzles that recorded any ultrasonic indications. Three nozzles were determined to contain indications of discontinuities that required engineering evaluation. The ultrasonic data supported the determination that these nozzles were not leaking. However, for one nozzle, the indication had significantly propagated into the J-groove weld region. Thus, for additional assurance, a bare metal visual examination was performed on that nozzle to confirm that no boron residue was present on the exterior surface of the vessel head near the nozzle. The ultrasonic data from the recently completed Davis-Besse vessel head examinations, which identified severe degradation, was reviewed for additional assurance that a similar condition did not exist at Millstone.

The three nozzles with indications were repaired. After the original CEDM nozzles were machined away from the lower extent up into the volume of the vessel head, liquid penetrant examinations were conducted on the bored area of the vessel head. This surface exam interrogated the vessel head, J-groove weld, and the beveled portion of the original CEDM nozzle. No indications were recorded. After repairs were completed, liquid penetrant and ultrasonic examinations were performed on the repair welds, and no indications were recorded.

Millstone Unit 3 Reactor Vessel Head Examinations

In accordance with NRC Bulletin 2001-01, Millstone Unit 3 is in the lowest category of susceptibility for CEDM nozzle cracking. During a recent Millstone Unit 3 refueling outage, an evaluation was performed for the reactor vessel head overall condition. A thorough visual examination was performed on all exposed external surfaces for evidence of boron leakage.

The examinations were performed on the exposed vessel head base material for evidence of degradation and the CRDM penetration annular region between the CRDM nozzles and vessel head base material for evidence of Reactor Coolant System leakage. The entire top surface of the vessel head base material was inspected, as well as all 78 CRDM penetrations (a full 360^{o} around). A dual verification process was utilized for 100% of the locations within the inspection scope.

The results of this examination concluded that there was no evidence of material degradation or reactor coolant system leakage. Millstone Unit 3 has also had an analysis performed that shows that there will be a gap between all of the CRDM penetrations and the reactor vessel head during operation to provide a leak path should a through wall crack develop in a penetration nozzle.

Other Operating Experience

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Linear Indication Found on Reactor Coolant System Piping during ISI Examinations

During the performance of ISI Examinations, a linear indication was detected on reactor coolant system piping outside of the ASME Section XI examination boundary. The indication was evaluated to ASME Section XI acceptance criteria, and was determined to exceed the length acceptance criteria for weldments. A re-performance of the examination in the area in question confirmed the results from the original examination. An Engineering evaluation determined that rework/repair was necessary. The evaluation specified surface preparation in the form of buffing, and if necessary, grinding to remove the indication. The area in question was buffed. Ultrasonic and liquid penetrant examinations of the buffed area were performed and found to be satisfactory. No grinding was required.

Support Does Not Meet Visual Acceptance Criteria

During performance of a VT-3 visual examination, the acceptance criteria were not met for a support located on the suction piping to the turbine driven auxiliary feedwater pump. The south side of the load plate was set at 5/8” as indicated on the load scale, and the north side of the load plate was approximately ¼ “higher. Thus, the load setting was deemed indeterminate. Also, one anchor bolt did not have full thread engagement (i.e. one thread short of being flush). Engineering performed a walkdown and an evaluation to disposition the support. Both conditions were dispositioned “use-as-is”. The reason for the different indications was that the load column (which was threaded into the load indicator plate inside the spring can housing) was slightly askew from vertical. Based upon a review of load tables, the Engineering evaluation determined that the resulting minor difference in load deflection was negligible. The anchor bolt was accepted based upon a referenced calculation. The evaluation concluded that neither the structural integrity of the support nor the safety function of the suction piping for the turbine driven auxiliary feedwater pump were impacted.

Unacceptable Surface Indication Detected during ISI Examination of Piping Weld

A surface indication was detected during an ISI examination of a piping weld. A liquid penetrant examination detected a rounded indication on a valve body side weld. The indication was indicative of a surface pore formed during casting. An Engineering evaluation concluded that the item was “Not a Nonconforming Condition”. An engineering evaluation data sheet was completed in accordance with ASME Section XI, Subsection IWB-3514.3 and Table IWB-3514-2. The actual indication depth was found to be within the acceptable limits allowed by Table IWB-3514-2, and no further action was required.

Conclusion

The *ISI Program: Systems, Components, & Supports* 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.

B2.1.19 INSPECTION ACTIVITIES: LOAD HANDLING CRANES AND DEVICES

Program Description

This *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 baseplates and anchorages for the runways and monorails.

NUREG-1801 Consistency

The *Inspection Activities: Load Handling Cranes and Devices* program is an existing program that is consistent with NUREG-1801, Section XI. M23, “Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems.”

Exceptions to NUREG-1801

The *Inspection Activities: Load Handling Cranes and Devices* program takes no exceptions to the aging management program described in NUREG-1801, Section XI. M23, “Inspection of Overhead Heavy Load [Related to Refueling] Handling Systems.”

Enhancements

Enhancement 1: Inclusion of In-Scope Lifting Devices

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 15.

This enhancement will be implemented prior to the period of extended operation.

<u>Program Elements Affected</u>

- **Scope of Program**

  This program element identifies that the program manages the effects of loss of material on the crane and trolley structural components for those cranes in the scope of license renewal and the effects of wear on the rails in the rail systems. Any lifting devices in the scope of license renewal and not currently included in the

Inspection Activities: Load Handling Cranes and Devices program, will be added to the program.

Enhancement 2: Inspection Criteria

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 by Enhancement 1. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 16.

This enhancement will be implemented prior to the period of extended operation.

<u>Program Elements Affected</u>

- **Detection of Aging Effects**

  The changes in the implementing procedures and documentation for the visual inspections will ensure that degradation of the lifting devices is identified before there is a loss of intended function.

Operating Experience

During the operating history of Millstone Power Station, 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. 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.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Loose Bolting Connection Was Found On Spent Fuel Cask Crane Supporting Girders</u>

A loose bolting connection was observed on the supporting girders of the spent fuel cask crane. The extent of the condition was evaluated and determined to not affect the load carrying capacity of the crane assembly. The bolting connections were subsequently retorqued.

<u>Two Polar Crane Fixed Rail Girder Fasteners Found Loose During Inspections</u>

During an inspection of the polar crane, two bolts were found to be loose. The loose fasteners were replaced.

Conclusion

The *Inspection Activities: Load Handling Cranes and Devices* 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.

B2.1.20 REACTOR VESSEL SURVEILLANCE

Program Description

The *Reactor Vessel Surveillance* program manages the aging effect of loss of fracture toughness due to neutron embrittlement of the low-alloy subcomponents in the beltline region of the reactor vessel. Neutron dosimetry and material properties data derived from the reactor vessel materials' irradiation surveillance program are used in calculations and evaluations that demonstrate compliance with 10 CFR 50, Appendix H (Reference B-39) and RG 1.99 (Reference B-40). This program ensures compliance with the Technical Requirements Manual requirements that surveillance specimens are removed and examined at predetermined intervals established in Technical Specifications to monitor the changes in the material properties and the results of the examinations be used to update Technical Specification operating limits.

The *Reactor Vessel Surveillance* program formally uses Regulatory Guide 1.99, Position 1, to project the extent of reactor vessel neutron embrittlement for the period of extended operation. Reactor vessel neutron embrittlement is also evaluated with consideration given to Regulatory Position 2 for comparison to the calculated values to ensure that the calculated values are more conservative. To date, use of the chemistry tables in accordance with Position 1 has been more conservative for determining the extent of embrittlement at Millstone.

Capsule removal schedules are adjusted as necessary based on the results of the neutron dosimetry and material properties data analyses.

NUREG-1801 Consistency

The *Reactor Vessel Surveillance* program is an existing program that is consistent with NUREG-1801, Section XI.M31 “Reactor Vessel Surveillance.”The *Reactor Vessel Surveillance* program formally uses Regulatory Guide 1.99, Position 1, to project the extent of reactor vessel neutron embrittlement for the period of extended operation. Reactor vessel neutron embrittlement is also evaluated with consideration given to Regulatory Position 2 for comparison to the calculated values to ensure that the calculated values are more conservative. To date, use of the chemistry tables in accordance with Position 1 has been more conservative for determining the extent of embrittlement at Millstone.

Exceptions to NUREG-1801

The *Reactor Vessel Surveillance* program takes no exceptions to the aging management program described in NUREG-1801, Chapter XI, Section M31, “Reactor Vessel Surveillance.”

Enhancements

The *Reactor Vessel Surveillance* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Chapter XI, Section M31, “Reactor Vessel Surveillance.”

Operating Experience

The Millstone units use heatup and cooldown curves (pressure and temperature limits) that have been updated using results from the vessel surveillance specimen evaluations. Similarly, both units have been evaluated to have an RT_{PTS} value that is within the acceptance criteria of 10 CFR 50.61. Calculated and surveillance values for the Charpy upper shelf energy have been verified to remain above the 10 CFR 50 Appendix G limit of 50 ft-lbs.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>P/T Heatup and Cooldown Curves May Be Non-conservative</u>

Based on reviews conducted in accordance with 10 CFR 50.54(f), the pressure/temperature heatup and cooldown curves required by Technical Specifications were found to be potentially non-conservative. Existing calculations had not addressed the following issues with appropriate instrument uncertainties:

- Minimum bolt-up (bolt-preload) temperature
- Lowest service temperature
- Minimum temperature requirements of 10 CFR 50, Appendix G,
- Pressure corresponding to 20% of the pre-service hydrostatic test pressure
- Pressure correction factors that account for static and dynamic differences.

Until 1993, when the NRC issued Information Notice 93-58, most nuclear power plants did not include additional correction factors to account for the static and dynamic pressure differences between the location of the gauges and the limiting RCS location. Engineering completed a re-evaluation of the P/T curves to address all of the related issues identified as part of 10 CFR 50.54(f) and other reviews completed between December 1995 and June 1997. The appropriate updates to plant Technical Specifications and the Final Safety Analysis Report were made.

Surveillance Capsule Removal Procedure Requires Enhancement to Document Examination Process

The procedure for surveillance capsule removal needed enhancement to adequately describe the examination process after removal of the surveillance capsule from the reactor vessel, and to tie the Technical Specification requirement for update of the pressure-temperature curve to the procedure. The existing procedure provided adequate detail for removal of the capsule from the vessel and its transfer to the spent fuel pool, but not for the examination of, and subsequent update to, the Technical Specifications. The procedure was revised to add the necessary steps for having the surveillance capsule shipped to an off-site facility for analysis and subsequent initiation of a Technical Specification change to update the pressure-temperature curve and EFPY tables. The procedure has since been revised to clarify that the results of the analysis are evaluated for impact, and the pressure-temperature curves are updated as necessary.

Conclusion

The *Reactor Vessel Surveillance* program ensures that the effects of aging associated with the in-scope components (i.e. low-alloy subcomponents in the beltline region of the reactor vessel) 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.

B2.1.21 SERVICE WATER SYSTEM (OPEN-CYCLE COOLING)

Program Description

The *Service Water System (Open-Cycle Cooling)* program addresses the aging effects of loss of material due to various forms of corrosion and buildup of deposits due to fouling. The program implements the NRC guidelines in Generic Letter 89-13 (Reference B-9), which include:

a) surveillance and control of biofouling;

b) maintaining heat exchanger heat transfer capability, for Millstone Unit 2, regular inspection and cleaning of heat exchangers (in lieu of thermal performance testing), and, for Millstone Unit 3, regular inspection and cleaning of heat exchangers or a test program to verify heat transfer capabilities;

c) routine inspection and a maintenance program to ensure that corrosion (including microbiologically influenced corrosion), erosion, protective coating failure, silting, and biofouling do not degrade the performance of safety-related systems serviced by the Service Water System;

d) a system walkdown inspection to ensure compliance with the licensing basis; and

e) a review of maintenance, operating, and training practices and procedures.

In lieu of thermal performance testing, the Millstone Unit 3 Reactor Plant Component Cooling System heat exchangers are regularly inspected and cleaned, and the Millstone Unit 3 Containment recirculation coolers are maintained in a dry lay-up condition to preclude fouling.

NUREG-1801 Consistency

The *Service Water System (Open-Cycle Cooling)* program is an existing program that is consistent with NUREG-1801, Section XI.M20, “Open Cycle Cooling Water System”, with the exception described below.

NUREG-1801 discusses the flushing and testing requirements in accordance with Generic Letter 89-13 (Reference B-9) for “infrequently used cooling loops”. The redundant cooling loops for the Service Water System are not in continuous service but are rotated into service on a regular basis. Thus, the flushing and testing requirements in accordance with GL 89-13 for “infrequently used cooling loops” do not apply to these loops.

Exceptions to NUREG-1801

Exception 1: Inspection and Cleaning of Heat Exchangers In Lieu of Thermal Performance Testing (Millstone Unit 2 Only)

Millstone Unit 2 relies on frequent, regular inspection and cleaning of heat exchangers, in lieu of thermal performance testing as documented in the Millstone Unit 2 response to GL 89-13 (Reference B-28). Frequent regular inspection and cleaning meets the intent of the NUREG-1801 for ensuring that heat exchangers are capable of performing their intended functions during the period of extended operation.

Program Elements Affected

- **Scope of Program**

  This program element in NUREG-1801 addresses the aging effects of loss of material due to various forms of corrosion and buildup of deposits due to fouling, and includes a test program to verify heat transfer capabilities. Millstone Unit 2 relies on frequent, regular inspection and cleaning of heat exchangers to maintain heat exchanger thermal performance, in lieu of thermal performance testing, which is allowed by GL 89-13.

- **Detection of Aging Effects**

  This program element identifies that thermal performance testing is an effective method to measure surface condition of service water components (e.g., heat exchanger tubes). Millstone Unit 2 relies on frequent, regular inspection and cleaning of heat exchangers to maintain the surface condition of the service water components. Maintaining the surface condition in this manner is allowed by GL 89-13, in lieu of thermal performance testing.

- **Monitoring and Trending**

  This program element specifies that heat transfer capability testing results are documented in plant test procedures and are trended and reviewed by the appropriate group. As noted above, Millstone Unit 2 does not perform thermal performance testing and does not monitor or trend the results.

Exception 2: Inspection and Cleaning of Heat Exchangers In Lieu of Testing (Millstone Unit 3 Only)

For Millstone Unit 3, the NRC staff has been notified in docketed correspondence that the Reactor Plant Component Cooling System heat exchangers and Containment recirculation coolers are not testable (References B-29 and B-30). 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 Water System heat exchangers are cleaned on the tube side and inspected quarterly. As with the other service water heat exchangers, trending and assessments of biofouling are performed for the Reactor Plant Component Cooling Water 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.

<u>Program Elements Affected</u>

- **Scope of Program**

  This program element in NUREG-1801 addresses the aging effects of loss of material due to various forms of corrosion and buildup of deposits due to fouling, and includes a test program to verify heat transfer capabilities. Millstone Unit 3 does not perform thermal performance testing of the identified heat exchangers. As noted above, alternate means of maintaining heat exchanger performance are used.

  - 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 quarterly.

The Millstone Unit 3 process for maintaining the thermal performance of the identified heat exchangers has been docketed and found acceptable.

- **Detection of Aging Effects**

This program element identifies that heat transfer capability testing is an effective method to measure the surface condition of service water components (heat exchanger tubes). Millstone Unit 3 maintains the surface condition by:

- Maintaining the Containment recirculation coolers in a dry lay-up condition and flushing the service water supply to these heat exchangers on a semi-annual basis.
- Cleaning and inspecting the tube side of the Reactor Plant Component Cooling System heat exchangers on a quarterly basis.

- **Monitoring and Trending**

This program element specifies that heat transfer testing results are documented in plant test procedures and are trended. As noted above, Millstone Unit 3 does not perform thermal performance testing of the identified heat exchangers and does not monitor or trend the results.

Exception 3: Flushing Requirements for Infrequently Used Cooling Loops (Millstone Unit 3 Only)

The Millstone Unit 3 Containment recirculation coolers and service water supply piping to these heat exchangers are “infrequently used cooling loops” but are not flushed in accordance with GL 89-13 (Reference B-29). The Containment recirculation coolers are maintained in a dry lay-up condition. Thus, no mechanism exists 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 the heat exchangers. The accumulated debris on the screens is then removed after the flushing evolution.

<u>Program Elements Affected</u>

- **Preventive Actions**

As noted above, the Millstone Unit 3 Containment recirculation coolers are not periodically flushed since the coolers are maintained in a dry lay-up condition. Thus, no mechanism exists for tube-side fouling. 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 the heat exchangers.

The accumulated debris on the screens is then removed after the flushing evolution. These actions meet the intent of the NUREG-1801 requirement.

Enhancements

The *Service Water System (Open-Cycle Cooling)* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M20, “Open Cycle Cooling Water System.”

Operating Experience

Millstone has extensive experience with identifying and resolving degradation of the Unit 2 and 3 Service Water Systems. Procedures have been developed for inspections and testing to address the aging effects of loss of material and buildup of deposits. Inspection and testing results have been used as input to the Engineering evaluation process for making necessary adjustments to the inspection and testing frequencies and scopes. Inspections and tests have led to piping repairs and design changes that have been implemented to replace degraded portions of the Service Water Systems.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Degraded Wall Thickness Found on Service Water Return Piping in the Service Water Pipe Enclosure</u>

Ultrasonic measurements of susceptible service water piping inside the Unit 3 service water pipe enclosure were performed in July 2002 because of previously known piping degradation. The inspection found areas of degraded wall thickness. The piping was degraded at three locations. The erosion of two of the areas was due to the geometry of the piping. The return piping descends vertically from the 64 foot elevation of the Control Building inside the pipe enclosure. It makes two 30 degree turns during this vertical run and erosion occurs in the two 30 degree elbows and immediately downstream of the elbows. In the third area, galvanic corrosion of the copper nickel piping occurred near the bottom of the vertical run where it is welded to a 90 degree nickel-based alloy elbow which was installed to reduce erosion. The piping was evaluated and determined to be structurally adequate and remains in service. The degraded areas are small and localized, with no leaks. The repair of the degraded piping has been scheduled. The extent of condition has been evaluated and additional inspections of this service water train and the other service water train are planned.

<u>The Service Water Heat Exchanger Fouling Surveillance Identified That The Safety Injection Pump Lube Oil Cooler Was Just Below Action Range</u>

During the service water heat exchanger fouling surveillance, the differential pressure for the safety injection pump lube oil cooler was found to be just below the action range as specified by the surveillance procedure. The previous surveillance performed a week earlier was well within the acceptance range. It was hypothesized that a small storm that occurred since the last surveillance, that challenged the intake systems with mussel shells, may have introduced debris into the service water system. The heat exchanger was opened, inspected, and cleaned. The heat exchanger exhibited normal flow and differential pressure after its return to service.

ARCOR Epoxy Delamination on Residual Heat Removal Room Ventilation Heat Exchanger Tube Sheet

The service water channel (inlet/outlet) head for the condenser of a residual heat removal room ventilation heat exchanger was removed to investigate an indication of ARCOR epoxy delamination in the out head section. This indication proved false and no signs of delamination were found on the channel head. However, delaminations at the edge of the tubesheet/channel head interface were identified. The damaged coating was repaired.

Corrosion Pitting Present on Service Water Pipe Spool

Corrosion pitting was discovered on the outside diameter of a service water spool piece. The corrosion occurred because the outside diameter was unprotected cast iron. This portion of the pipe was exposed to seawater, which allowed it to corrode. The outside diameter of the pipe was coated with ARCOR epoxy to restore the proper protection of the metal surfaces from corrosion. Two voids were discovered on the inside of two flange bolt holes and were believed to be original casting defects. These voids were evaluated by Engineering and judged to be acceptable. ARCOR epoxy was applied to these areas to preclude further damage by corrosion. Spool/component drawings were updated to show the location of the ARCOR epoxy repairs.

Conclusion

The *Service Water System (Open-Cycle Cooling)* 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.

B2.1.22 STEAM GENERATOR STRUCTURAL INTEGRITY

Program Description

The *Steam Generator Structural Integrity* program manages the aging effects of cracking and loss of material and adopts the performance criteria and guidance for monitoring and maintaining steam generator tubes as defined in NEI 97-06 (Reference B-6). It includes performance criteria for structural integrity, accident-induced leakage, and operational leakage, as well as the SG integrity and support elements as defined in NEI 97-06. The program includes preventive measures to mitigate degradation through control of primary side and secondary side water chemistry; assessment of degradation mechanisms; ISI of the steam generator tubes to detect degradation; evaluation and plugging or repair, as needed; and leakage monitoring to ensure the structural and leakage integrity of the pressure boundary. This program applies to the operation and maintenance of the steam generator tubes and supporting components (e.g., tube plugs, sleeves, and tube sheet). Tube inspection scope and frequency, plugging or repair, and leakage monitoring are in accordance with the Technical Specifications.

Industry programs are in place whose objectives include the investigation of aging effects applicable to nickel-based alloys (i.e., PWSCC in Alloy 600 base metal and Alloy 82/182 weld metals) and identification of appropriate aging management activities.

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, Table A6.0-1 License Renewal Commitments, Item 14.

NUREG-1801 Consistency

The *Steam Generator Structural Integrity* program is an existing program that is consistent with NUREG-1801, Section XI.M19, “Steam Generator Tube Integrity Program.”

NUREG-1801 references Westinghouse Reports WCAP-12244 and WCAP-12245 for identifying limits on the life of steam generator tube plugs and correlations for estimating their life. These documents do not apply to Millstone since Millstone Unit 2 is a Combustion Engineering plant with replacement Babcock and Wilcox steam generators and Millstone Unit 3 no longer uses the Westinghouse mechanical plugging process.

Exceptions to NUREG-1801

The *Steam Generator Structural Integrity* program takes no exceptions to the aging management program described in NUREG-1801, Section XI.M19, “Steam Generator Tube Integrity Program.”

Enhancements

The *Steam Generator Structural Integrity* program does not require enhancement to be consistent with the aging management program described in NUREG-1801, Section XI.M20, “Open Cycle Cooling Water System.”

Operating Experience

Millstone has extensive experience with identifying and resolving degradation of the steam generators. Procedures have been developed to address this degradation.

The following are representative excerpts from the internal operating experience documentation for the Millstone Unit 2 and 3 steam generator eddy current data analysis, which provide a chronology of steam generator baseline and inservice examination and tube plugging.

<u>Millstone Unit 2</u>

Factory Testing - Millstone Unit 2 began commercial operation in December of 1975. In the fall of 1992, the original Combustion Engineering Series 67 steam generators were replaced with steam generators designed by Babcock and Wilcox. Prior to shipment of these steam generators, bobbin coil eddy current examinations were performed on approximately 200 tubes in SG No. 1. The purpose of this examination was to collect data to be used for determining the optimal test parameters and developing analysis guidelines for on-site baseline examinations.

Baseline Testing - In August of 1991, a 100% baseline eddy current examination was performed on the replacement steam generator subassemblies prior to installation. The full length of each tube from the hot leg plenum was examined with a bobbin coil probe. No measurable flaws were detected in the tubing. Testing did identify some tube ends containing tube-to-tubesheet crevice depths that exceeded the.25 inch maximum design criteria, which were re-expanded to meet the criteria.

Mid-cycle 13 Outage ISI - During the mid-cycle 13 outage (June 1997), a total of 6,408 tubes (75.2%) in SG No. 1 and 2,565 tubes (30.1%) in SG No. 2 were tested from end to end with bobbin probes as part of the Inservice Inspection Program. The inspection revealed no indication of tube degradation. Assorted benign indications (i.e., dings, manufacturing buff marks, etc.) were reported.

<u>Millstone Unit 3</u>

Factory Testing - Prior to shipment of the Millstone Unit 3 steam generators from Westinghouse's Florida facility, a total of five tubes were plugged as a result of factory eddy current testing.

Baseline Testing - In June of 1985, a 100% baseline eddy current examination was performed on the steam generators following installation. Each tube was examined full-length, with the majority of the examinations being performed from the hot leg plenum. The examination was performed using the ZETEC MIZ-18 digital data acquisition system. Eight-coil profilometry was also performed on 600 tube locations. A total of 675 tubes contained measurable wall loss resulting from the manufacturing process. In addition, several extraneous indications were identified throughout the tube bundle. A total of five tubes were plugged.

Refueling Outage 6 ISI - In May of 1999, full-length bobbin probe examinations were performed on all of the in-service tubes in steam generators “A” and “C”. Extensive testing (6,148 locations) was also performed with rotating probes in these steam generators to examine areas of tubing for which the bobbin test was not qualified. Rotating probe exams were concentrated in the hot leg expansion transitions, expansion irregularities, Row 1 and 2 u-bends, dents, and plugs. A limited examination was also performed in steam generator “D” to address two flaw indications and several possible loose parts reported during the 1995 examination. No evidence of cracking was detected. A total of 14 tubes were plugged as a result of this examination. One tube was plugged preventively to address probable foreign object wear. The remaining tubes were plugged as a result of anti-vibration bar wear, some exceeding the Technical Specification repair limit. Six Inconel 600 plugs were replaced with Inconel 690 plugs to address crack susceptibility issues, leaving no remaining Inconel 600 plugs in the Millstone Unit 3 steam generators.

Conclusion

The *Steam Generator Structural 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.

B2.1.23 STRUCTURES MONITORING PROGRAM

Program Description

The *Structures Monitoring Program* manages the aging effects of cracking, loss of material, and change of material properties by the monitoring of structures and structural support systems that are in the scope of license renewal. The majority of these structures and structural support systems are monitored under 10 CFR 50.65 (Reference B-18) as addressed in Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.160, Rev. 2 (Reference B-19), and NUMARC 93-01, Rev. 2 (Reference B-20). 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, HELB barriers, and flood gates) are also monitored to ensure there is no loss of intended function.

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 *Structures Monitoring Program* inspects large equipment supports. The scope of 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 or the structural condition of the hangers and supports incorporated into the General Condition Monitoring program.

Though coatings may have been applied to external surfaces of structural members, no credit was taken for these coatings in the determination of the aging effects for the underlying materials. The *Structures Monitoring Program* evaluates the condition of the coatings as an indication of the condition of the underlying materials.

NUREG-1801 Consistency

The *Structures Monitoring Program* is an existing program that is consistent with the following sections of NUREG-1801:

- Section XI. S5 “Masonry Wall Program”
- Section XI. S6 “Structures Monitoring Program”
- Section XI.S7 “R.G. 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants.”

Exceptions to NUREG-1801

The *Structures Monitoring Program* takes no exceptions to the aging management programs described in the following NUREG-1801 sections:

- Section XI. S5 “Masonry Wall Program”
- Section XI. S6 “Structures Monitoring Program”
- Section XI.S7 “R.G. 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants.”

Enhancements

Enhancement 1: Use of ACI 349.3R-96 and ANSI/ASCE 11-90

NUREG-1801 recommends the use of ACI 349.3R-96 (Reference B-5) and ANSI/ASCE 11-90 (Reference B-41), as a reference for recommendations for the development of an evaluation procedure for nuclear safety-related concrete structures and existing buildings. These documents were not used or referenced as a standard for establishing the *Structures Monitoring Program*. The implementing procedures will be modified to include ACI 349.3R-96 and ANSI/ASCE 11-90 as references and as input documents for the inspection program. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 17.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.S6 - Parameters Monitored or Inspected**

  A review of the parameters to be monitored or inspected for concrete and steel structural elements in the *Structures Monitoring Program* and the parameters identified in ACI 349.3R-96 and ANSI/ASCE 11-90 indicates the program meets the intent provided by these standards. These standards will be added as a reference and input document in the *Structures Monitoring Program* implementing procedures.

- **XI.S6 - Detection of Aging Effects**

  A review of the *Structures Monitoring Program* inspection intervals indicates these intervals are consistent with those specified in ACI 349.3R-96 and ANSI/ASCE 11-90. This consistency will allow the standards to be added as a reference in the *Structures Monitoring Program* implementing procedures.

- **XI.S6 - Acceptance Criteria**

  A review of the *Structures Monitoring Program* acceptance criteria indicates that the program meets the intent with those specified in ACI 349.3R-96 and ANSI/ASCE 11-90. These standards will be added as reference and input documents in the *Structures Monitoring Program* implementing procedures.

Enhancement 2: Addition of Structures to the *Structures Monitoring Program*

The *Structures Monitoring Program* does not currently monitor all structures in-scope for license renewal. The *Structures Monitoring Program* and implementing procedures will be modified to include all in-scope structures. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 18.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.S6 - Scope of Program**

  This program element identifies the structure/aging effect combinations that are managed by the *Structures Monitoring Program*. Any structures in the scope of license renewal and not currently included in the *Structures Monitoring Program* will be added to the applicable inspection procedures.

Enhancement 3: Sampling of Groundwater

Groundwater samples have been taken in support of license renewal to establish a baseline with regard to the aggressiveness of the water and its effect on concrete structures. 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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 19.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.S6 - Parameters Monitored or Inspected**

  NUREG-1801 indicates that the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected. The *Structures Monitoring Program* will be modified to incorporate a program for periodic, considering seasonal variations, groundwater testing and evaluation to monitor groundwater aggressiveness.

- **XI.S6 - Detection of Aging Effects**

  The *Structures Monitoring Program* will be modified to incorporate a program for periodic groundwater testing, considering seasonal variations, to ensure timely detection and evaluation of groundwater aggressiveness.

Enhancement 4: Engineering Notification of Submerged Medium Voltage Cables

The *Structures Monitoring Program* and implementing procedures will be modified to alert the appropriate engineering organization if structures inspections identify that medium voltage cables in the scope of license renewal have been submerged. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 20.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **XI.S6 - Parameters Monitored or Inspected**

  This NUREG-1801 program element identifies that specific parameters are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of the degradation can be determined. The *Structures Monitoring Program* will incorporate a requirement to notify engineering staff if the structures inspections identify that medium voltage cables in the scope of license renewal has been exposed to significant moisture (submerged).

Enhancement 5: Inspection of Normally Inaccessible Areas That Become Accessible

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 21.

This enhancement will be implemented prior to the period of extended operation.

<u>Program Elements Affected</u>

- **XI.S6 - Detection of Aging Effects**

  The NUREG-1801 program element identifies methods or techniques to ensure timely detection of aging effects. The *Structures Monitoring Program* will incorporate the logic to perform an inspection of a previously inaccessible area when that area becomes accessible during maintenance or for any other reason.

Operating Experience

Operating experience indicates that 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.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Maintenance Rule Structure Baseline Inspection Identified Items to Repair and Monitor</u>

The 10 CFR 50.65 Maintenance Rule plant structures baseline condition assessment inspections for in-scope structures, in accordance with plant procedures, identified 261 items and documented them in the Millstone Unit 2 10 CFR 50.65 maintenance rule plant structures baseline condition assessment report. All of the findings from this inspection were categorized according to procedural guidelines. For those items which were determined to potentially “deteriorate to an unacceptable condition if not corrected prior to the next scheduled examination” (3-year inspection cycle), trouble reports were generated. The deficiencies reported by the inspection personnel were walked down and re-examined by the System Engineer for Millstone Unit 2 structures. All items were verified to be non-functional failures, and only the result of expected “in use” service and normal aging. Required repair activities for each building were initiated.

<u>Cracking on Support Plate to Service Water Pump</u>

An inspection of the seismic support for piping between a service water strainer and the associated service water pump strainer backwash valve revealed that the concrete base was cracking and the support was coming out of its anchorage. Areas of loose grout were found under the support plate and evidence of cracking was found along the seam where it met the floor. Engineering staff inspected the affected component as well as all other support plates in the service water cubicles for similar failures and none were found. It was determined that the failure was due to a defect in the original installation.

As part of the corrective action plan, the degraded seismic support was repaired and supports for all equipment and components commonly subjected to service water (salt water) exposure were inspected by Engineering staff. As a result of this inspection, 9 additional items were identified as degraded, none of which was seriously degraded, and work orders were generated to effect repairs.

Turbine Building Exhaust Hoods Experiencing Corrosion

While conducting Millstone Unit 3 Maintenance Rule baseline structural condition walkdowns, the six roof ventilation exhaust hoods on the Turbine Building roof were observed to be experiencing severe corrosion. The corrosion had led to considerable loss of material at or near the base and reinforcement areas of the hoods. Pending potential future replacement of the hoods, repair activities were initiated to stabilize the equipment. To monitor their condition, the hoods were inspected approximately six months later. The as-found condition was good with no further significant degradation identified.

Potential for Submergence of Safety-Related Cables

Industry operating experience identified examples where safety-related cables had the potential to be submerged. Initial investigation for applicability of this operating experience to Millstone determined that some electrical manholes containing safety-related medium voltage cables had the potential for potential submergence. Millstone Units 2 and 3 each identified seven manholes that were potentially susceptible to this problem.

A review indicated that the cables in the Millstone Unit 3 manholes had not been submerged.

A review of Millstone Unit 2 indicated that cables in manholes may have been submerged. The specific safety-related cables were identified and a review was conducted of the manufacturers, purchase specifications, and qualification records. The cables were inspected for degradation and none was found. Based on the inspection results and the cable design information, an engineering evaluation determined that the installed cables were acceptable for continued use.

Conclusion

The *Structures Monitoring 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.

B2.1.24 TANK INSPECTION PROGRAM

Program Description

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 the concrete foundation and evaluations to monitor the condition of coatings, linings, and structural element, to prevent deterioration of the tanks to unacceptable levels. To mitigate or preclude loss of material, the external surfaces of above ground carbon steel tanks are painted or coated, consistent with industry standards.

For accessible locations, loss of material is detected by periodic visual inspections of the tank exteriors and internals. If potential degradation of the tank walls/bottoms is identified or is suspected, appropriate NDE methods are employed to determine the extent of degradation. For inaccessible locations, such as the external surfaces of tank bottoms, thickness measurements will be taken to ensure that significant degradation is not occurring.

Though coatings have been applied to the external and internal surfaces of tanks, no credit was taken for these coatings in the determination of the aging effects for the underlying materials. The *Tank Inspection Program* evaluates the condition of the coatings as an indication of the condition of the underlying materials.

Though sealant or caulking has been applied in and around above ground tanks and their concrete foundations, no credit was taken for the sealant or caulking in the determination of the aging effects for the external surfaces of tank bottoms. The *Tank Inspection Program* evaluates the condition of the sealant and caulking as an indication of the condition of the inaccessible materials.

NUREG-1801 Consistency

The *Tank Inspection Program* is an existing program that is consistent with NUREG-1801, Section XI.M29, “Aboveground Carbon Steel Tanks.”

The scope of the NUREG-1801 program is limited to carbon steel tanks. The scope of the Millstone *Tank Inspection Program* includes all the tanks determined to be in the scope of license renewal, based on the intended functions the tanks perform, regardless of the material of construction, and that have aging effects needing to be managed as identified in the aging management review process.

Exceptions to NUREG-1801

The *Tank Inspection Program* takes no exceptions to the aging management program described in NUREG-1801, Section XI.M29, “Aboveground Carbon Steel Tanks.”

Enhancements

Enhancement 1: Inspection of Sealants and Caulkings

Appropriate inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be performed. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 22.

This enhancement will be implemented prior the period of extended operation.

<u>Program Elements Affected</u>

- **Scope of Program**

  This program element identifies the specific components subject to aging management for license renewal. Inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be added to the *Tank Inspection Program*.

- **Parameters Monitored/Inspected**

  NUREG-1801, Section XI.M29 identifies that periodic walkdowns are used to monitor degradation of sealant and caulking because it is directly related to loss of material for the tanks. Inspections of sealants and caulkings used for moisture intrusion prevention in and around aboveground tanks will be added to the *Tank Inspection Program*.

- **Detection of Aging Effects**

  This program element identifies methods or techniques used to ensure timely detection of aging effects. NUREG-1801, Section XI.M29 identifies that degradation of the tanks cannot occur without degradation of the sealant or caulking, and periodic walkdowns will confirm that the sealant and caulking are intact. Visual inspections will be performed with frequencies as established in the respective *Tank Inspection Program* plans for external inspections, and will confirm that sealant and caulking have not degraded.

- **Acceptance Criteria**

  NUREG-1801, Section XI.M29 identifies that the acceptance criteria for visual inspection of sealant and caulking is evidence of drying, cracking, or missing material. Visual inspections will be performed to confirm that sealant and caulking have not degraded by verifying no evidence of drying, cracking, or missing material.

Enhancement 2: Non-destructive Volumetric Examination of Inaccessible Tank Bottoms

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 23.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Detection of Aging Effects**

  This program element identifies methods or techniques used to ensure timely detection of aging effects. NUREG-1801, Section XI.M29 identifies that thickness measurements of the inaccessible tank bottoms should be taken to ensure that significant degradation is not occurring. Volumetric examinations of the inaccessible locations such as the external surfaces of tank bottoms will be performed as part of the *Tank Inspection Program* prior to period of extended operation to ensure that significant degradation is not occurring. Subsequent inspections will be performed on a frequency consistent with scheduled tank internals inspection activities.

- **Monitoring and Trending**

  NUREG-1801, Section XI.M29 identifies that loss of material due to corrosion of the underground external surface is detectable by thickness measurement of the tank bottom and is monitored and trended if significant loss of material for the tank wall/bottom is identified. The *Tank Inspection Program* will perform non-destructive volumetric examination of the inaccessible locations such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal and will perform monitoring and trending if significant loss of material for the tank wall/bottom is detected.

- **Acceptance Criteria**

  NUREG-1801, Section XI.M29 identifies that the thickness measurements of the tank bottoms are evaluated against design thickness and loss of material allowances. The *Tank Inspection Program* will perform non-destructive volumetric examination of the inaccessible locations such as the external surfaces of tank bottoms for those tanks that require aging management for license renewal and evaluate the thickness measurements for the tank bottoms against the design thickness and loss of material allowances.

Enhancement 3: Tanks Being Added to*Tank Inspection Program*

The following tanks are in-scope for license renewal, but are not currently identified on the respective *Tank Inspection Program* Plans. These tanks are being added to the *Tank Inspection Program* and will be included in the respective inspection plans.

•Security diesel fuel oil tank (Unit 2)

•Diesel fire pump fuel oil tank (Unit 3)

This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 24.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Affected

- **Scope of Program**

  This program element identifies the specific components subject to aging management for license renewal. The above tanks will be added to the *Tank Inspection Program*.

Operating Experience

Review of Millstone's operating experience has indicated that the *Tank Inspection Program* is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of in-scope aboveground tanks.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Interior Of a Fire Water Tank Degraded - Loss of Material

During an inspection of a fire water tank, significant loss of material was identified on the internal tank surface. The tank was taken out of service and further visual and UT examinations were performed. As a result of the examinations, it was determined that both fire water tanks, while operable, would require replacement. The tanks were subsequently replaced with internally coated tanks.

Millstone Unit 3 Condensate Storage Tank Leaking

During an inspection of the condensate storage tank, water was found to be slowly leaking from the tank. Recent 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.

Results of Internal Inspection of the Millstone Unit 2 Emergency Diesel Generator Fuel Oil Day Tanks

Internal tank inspections were performed on the Millstone Unit 2 emergency diesel generator fuel oil day tanks in January 2002 as required by the The *Tank Inspection Program*. The tanks were drained, the manways opened, and residual oil on the bottom of the tank was removed. The internal tank inspections were performed in accordance with the The *Tank Inspection Program* implementing procedure. The inspection included a visual inspection of the accessible tank seam welds for cracking, distortion, corrosion or other evidence of deterioration, visual inspection of the accessible tank walls, head and bottom for cracking, distortion, corrosion pitting or other evidence of deterioration, and visual inspection of accessible tank internal nozzles for cracking erosion, corrosion or other evidence of deterioration. The inspections did not discover any reportable conditions and the condition of the tank internals were described as “like new”. The tanks were closed and returned to service.

Conclusion

The *Tank Inspection Program* ensures that the effects of aging associated with the in-scope tanks 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.

B2.1.25 WORK CONTROL PROCESS

Program Description

The *Work Control Process* is an existing, plant-specific program that integrates and coordinates the combined efforts of Maintenance, Engineering, Operations, and other support organizations to manage maintenance activities. The *Work Control Process* is utilized 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.

Performance testing and maintenance activities, both preventive and corrective, are planned and conducted in accordance with the *Work Control Process*. These maintenance activities provide opportunities to visually inspect the internal and external surfaces of plant components and plant commodities. 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.

Millstone uses *Work Control Process* for verifying the effectiveness of the Chemistry Control for Primary Systems Program, Chemistry Control for Secondary Systems Program, and Fuel Oil Chemistry program.

Aging Management Program Elements

A comparison of the *Work Control Process* to ten elements described in Appendix A of NUREG-1800 (Reference B-1) is provided below.

Scope of Program

Performance testing and maintenance activities, both preventive and corrective, are planned and conducted in accordance with the *Work Control Process* as implemented by the maintenance and work control procedures. Activities conducted for the *Work Control Process* provide the opportunity to perform and document visual inspections of the internal and external surfaces of the various material and environment combinations of plant components within the scope of license renewal. The scope of the *Work Control Process* includes the following activities:

- 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 lubricating oils and engine coolant.
- Recurring inspection and surveillance activities.
- Equipment monitoring, trending, and analysis.

Preventive Actions

The inspection activities conducted as part of the *Work Control Process* are designated as condition monitoring. The testing activities of the *Work Control Process* are designated as performance monitoring. The chemistry control activities, in conjunction with the maintenance sampling activities, are designated as preventive actions.

Parameters Monitored or Inspected

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*, to determine the presence of cracking, loss of material, buildup of deposits, and change of material properties. Lubricating oil and engine coolant samples are analyzed to detect contaminants as an indication of an adverse environment that can lead to material degradation.

Detection of Aging Effects

Cracking, loss of material, buildup of deposits, and change of material properties are the aging effects that are monitored by visual inspections of the internal and external surfaces of 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.

Monitoring and Trending

The 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*, including completed procedures and technical reviews of engineering evaluations. In addition, as delineated in the implementing preventive maintenance (PM) procedures, reviews and evaluations of PM activities are conducted for changes to PMs, including deferrals, missed implementation dates, and frequency changes, as well as additions, revisions or deletions. Reviewers include appropriate System Engineers, PM Coordinators and affected Program Owners.

Additionally, an integral function of the *Work Control Process* 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 PMMS.

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.

Acceptance Criteria

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.

Corrective Actions

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. Any resultant maintenance or repair activities are performed in accordance with applicable engineering requirements and the maintenance and work control procedures. The Corrective Action Program provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable. Where evaluations are performed without repair or replacement, engineering analysis reasonably assures that the intended function of the system, structure, or component is maintained consistent with the current licensing basis. The Corrective Action Program identifies repetitive discrepancies, considers the extent of the condition, and initiates additional corrective action, as appropriate, to preclude recurrence.

Confirmation Process

QA procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B.

If degradation that requires repair is identified during monitoring activities, corrective actions are implemented. Additionally, inspection results from reviews by outside organizations are used to help confirm the maintenance of plant integrity and materiel condition.

Administrative Controls

Administrative and implementing procedures are reviewed, approved, and maintained as controlled documents in accordance with the procedure control process and the Quality Assurance Program.

Operating Experience

Station operating experience indicates that the *Work Control Process* 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 components and plant commodities to perform their intended functions.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

<u>Broken Pipe Support in the Charging System</u>

A pipe support in the charging pump cubicle was broken. An engineering evaluation was performed to address the cause of the failure, the extent of condition, and recommended corrective actions. It was determined that the failure was caused by paint build-up and corrosion on a pipe support that prevented the pipe from moving, thereby causing cyclic failure of the support. Piping supports for the two other charging pumps were inspected for similar conditions and a number of supports were reworked to restore proper clearances. No damaged supports were found. The broken pipe support was repaired and returned to service.

<u>Thinning Pipe Wall Identified in the Service Water System</u>

While performing preventive maintenance on a Service Water System valve, maintenance identified a loss of material on the inside of the adjoining six-inch pipe. An engineering evaluation was performed, which addressed the cause of the wall thinning and recommended corrective actions. It was determined that the wall thinning was caused by turbulence set up by the throttling of the upstream valve. This condition had not been previously identified. A calculation was performed that determined the actual wall thickness was acceptable. Consequently the piping remained in service until the following outage when the pipe was replaced with a material that was more resistant to the turbulent conditions.

<u>Corrosion of Pipe Flanges in the Service Water System</u>

While performing preventive maintenance on a Service Water System in-line strainer, maintenance identified corrosion on the flange faces of the connecting backwash piping. An engineering evaluation was performed. The corrosion was determined not to be significant enough to warrant repair or replacement at that time. The corrosion was expected to worsen with time so replacement pipe sections were fabricated and installed during next scheduled strainer overhaul.

<u>Fire Pump Inability to Develop Required Pressure</u>

During a periodic surveillance test, one of the fire pumps was not able to obtain the required total head to demonstrate its operability. An engineering evaluation was performed that investigated previous surveillance test results, which indicated a downward trend in differential pressure developed by the pump. The corrective actions included inspection of the pump suction and discharge piping to determine its condition. The inspection indicated there was a corrosion layer inside the pump suction piping. The degraded pipe was replaced. Subsequent testing indicated that the pump performance returned to its normal levels.

Enhancements

Enhancement 1 - Performance of Inspections During Maintenance Activities

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. This commitment is identified in Appendix A, Table A6.0-1 License Renewal Commitments, Item 25.

This enhancement will be implemented prior to the period of extended operation.

Program Elements Effected

Monitoring and Trending

The NUREG-1801 program element identifies that the program should provide predictability of the extent of degradation, and timely corrective or mitigative actions. Maintenance and work control procedures will be changed to ensure that inspections of plant components and plant commodities will be appropriately and consistently performed and documented during maintenance activities.

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 appropriate maintenance and work control procedures will be change to provide reasonable assurance that inspections of plant components and structural commodities are appropriately and consistently performed before there is a loss of intended function

Conclusion

The *Work Control Process* program ensures that the effects of aging associated with the in-scope components and plant commodities 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.

B3.0 TLAA SUPPORT PROGRAMS

B3.1 ELECTRICAL EQUIPMENT QUALIFICATION

Program Description

Electrical Equipment Qualification program applies to certain electrical components that are important to safety and could be exposed to post-accident environment conditions, as defined in 10 CFR 50.49 (Reference B-26). The *EEQ* program ensures the continued qualification of this equipment during and following design basis accidents. The program determines the necessity for, and frequency of, component replacement or refurbishment in order to maintain the qualification of the equipment. Performance of preventive maintenance and surveillance activities, and the monitoring of normal ambient conditions, ensure that components remain within the bounds of their original qualification and provide a basis for extending qualified life through re-analysis.

In accordance with ISG-16, plant modifications, such as the installation or removal of equipment or systems, or non-identical replacement of existing components are evaluated to ensure qualification with 10 CFR 50.49. Changes to plant layout, piping additions or rerouting, system and equipment operating mode changes, and setpoint changes can affect the qualification basis of existing aging evaluations. Therefore, these changes are evaluated through the design control process for the potential impact to the *EEQ* program. The environmental qualification of plant equipment is reevaluated as necessary to account for these changes.

NUREG-1801 Consistency

The *Electrical Equipment Qualification* program is an existing program that is consistent with the Time-Limited Aging Analysis (TLAA) support program described in NUREG-1801, Section X.E1, “Environmental Qualification (EQ) of Electrical Components.”

Exceptions to NUREG-1801

The *Electrical Equipment Qualification* program takes no exceptions to the program described in NUREG-1801, Section X.E1, “Environmental Qualification (EQ) of Electrical Components.”

Enhancements

The *Electrical Equipment Qualification* program does not require enhancement to be consistent with the program described in NUREG-1801, Section X.E1, “Environmental Qualification (EQ) of Electrical Components.”

Operating Experience

Millstone ensures compliance with the environmental qualification requirements of 10 CFR 50.49 by maintaining EQRs for affected electrical components, evaluating and establishing the qualified life of affected components, and ensuring equipment refurbishment, requalification, or replacement prior to the end of the assigned qualified life. Based on a review of operating experience at Millstone Units 2 and 3, no specific examples of age-related degradation have been found for environmentally qualified components. The following occurrences were noted and considered in evaluating the effectiveness of the program:

Radiation Dose Identified as Exceeding the Maximum Radiation Dose Assumed for That EQ Zone

Radiation dose values for the B train motor-driven AFW pump room had been lowered to 4.2 X 10^3 rads in order to accommodate qualification requirements for newly installed Target Rock controllers. The room was considered to be a locally mild radiation area in a generally harsh environment EQ zone. As part of an on-going effort to revise calculations, the maximum post DBA dose for the B train motor-driven AFW pump room was found to exceed the 4.2 X 10^3 rads. It was identified that certain areas of this pump room would exceed 1 X 10^5 rads.

It is believed that the original calculation performed by Stone & Webster did not address all significant source terms in the ESF Building and did not represent the as-built configuration. Subsequent revisions by Engineering have been more thorough, resulting in the identification of additional source terms. The applicable calculations affected have been revised to address the additional source terms, and the EQ documentation (EQR) has been updated accordingly.

The newly installed Target Rock controllers were deemed acceptable because their local area of installation in the pump room did not exceed the 4.2 X 10^3 rads assumed for their qualification. More generally, all other components affected by the revised calculation were operable and fully qualified, because they had been qualified for a more generally harsh environment (>1 X 10^4).

EEQ Program Improvements Resulting from QA Audit

As a result of QA audit performed in May 1997, *EEQ* program improvements were implemented to better define the following areas:

- Responsibilities for key individuals related to EEQ.
- Organizational roles and management responsibilities.
- Controls for the extension of qualified life.
- Identification of EEQ related requirements in quality database.
- Training for personnel involved in EEQ related activities.

These corrective actions are representative of the significant improvements to the *EEQ* Program as part of the Millstone recovery effort (1997-1999). Generally, the Program Manual, Program Instructions, Walkdown Procedure, and Environmental Specifications were updated to better define the program. The EQ Master Lists were validated. Walkdowns verified component configurations, and the Equipment Qualification Records were updated. These efforts led to successful NRC Audits of the *EEQ* Program, which supported the restart of the Millstone Units.

EQ Program Manual Question Regarding Thermal Life Input

While attempting to use an average of actual plant temperatures as input to the qualified life calculations for EQ components, it was identified that the *EEQ* Program only permitted thermal life “based on maximum normal plant design, or most severe measured temperature assumed to occur for as long as the equipment is installed.” This requirement precluded the use of weighted averages as input to qualified life calculations, which is now an accepted industry practice. The *EEQ* Program was subsequently revised to allow the use of weighted averages, which, when performing re-analysis, allows the ability to take advantage of the potential excess conservatism built into existing calculations.

Conclusion

The *Electrical Equipment Qualification* 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.

B3.2 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

Program Description

The *Metal Fatigue of the Reactor Coolant Pressure Boundary* program includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the reactor coolant pressure boundary. This is accomplished by monitoring and tracking the number of critical thermal and pressure transients for selected Reactor Coolant System components to ensure that the number of design transient cycles is not exceeded during the operating life. Based on design basis screening criteria, a list of fatigue-sensitive components is developed and maintained. Fatigue-sensitive components include such locations, as the charging nozzle, emergency core cooling system safety injection nozzles, pressurizer surge nozzle, and pressurizer spray nozzle.

A significant issue associated with metal fatigue is the effect of a water environment on the design basis fatigue curves. NUREG/CR-6260 (Reference B-31) provides specific guidance to address environmental effects and recommendations for sample selection of those critical components in high-fatigue usage locations that should be monitored. Formulas for calculating the environmental correction factors for carbon and low alloy steel, and stainless steel are contained in NUREG/CR-6583, (Reference B-32) and NUREG/CR-5704 (Reference B-33), respectively.

Millstone has ensured that the environmental effects on fatigue sensitive locations are addressed for the period of extended operation in accordance with the TLAA (Section 4.3, Metal Fatigue). For Millstone Unit 3 only, specific locations were identified with a CUF greater than 1.0. The effects of environmentally assisted fatigue for those specific locations with a CUF greater than 1.0 will be managed by this program. This is a Millstone Unit 3 Only commitment and does not appear in the Millstone Unit 2 LRA.

NUREG-1801 Consistency

The *Metal Fatigue of RCPB* program is consistent with the Time-Limited Aging Analysis (TLAA) of the Aging Management Program (AMP) description provided in NUREG-1801, Section X.M1,"Metal Fatigue of the Reactor Coolant Pressure Boundary."

Exceptions to NUREG-1801

The *Metal Fatigue of RCPB* program takes no exceptions to the Time-Limited Aging Analysis (TLAA) of the aging management program described in NUREG-1801, Section X.M1,"Metal Fatigue of the Reactor Coolant Pressure Boundary."

Enhancements

The *Metal Fatigue of RCPB* program does not require enhancement to be consistent with the Time-Limited Aging Analysis (TLAA) of the aging management program described in NUREG-1801, Chapter X, Section M1, "Metal Fatigue of the Reactor Coolant Pressure Boundary."

Operating Experience

New fatigue-causing phenomena are continually evaluated and incorporated into the program to eliminate the potential for unscheduled shutdowns and to ensure plant safety and availability. Plant compliance with NSSS fatigue design bases is demonstrated by the generation of cumulative fatigue usage summaries and the comparison of cumulative plant transient operational cycles with their respective cyclic design limits. Component repair and failure/replacement logs at each plant are reviewed periodically to identify new fatigue-susceptible locations. Specific findings that may warrant further investigation are documented in program implementing procedures.

In reviewing operating experience at Millstone Units 2 and 3, the following occurrences were noted and considered in evaluating the effectiveness of the program:

Auxiliary Spray Use Resulted in Violation of the 350°F Technical Specification Limit

A review of past spray cycles at Millstone Unit 2 showed that 24 auxiliary spray actuations exceeded the Technical Specification limit of 350°F. The auxiliary spray line has 187 feet of stagnant piping at ambient temperature. The temperature indicator used to monitor whether heat-up and cooldown rates are exceeded is located downstream of the regenerative heat exchanger and upstream of an isolation valve. Thus, this indicator had been inappropriate for determining the auxiliary spray temperature when letdown is not isolated. The appropriate procedures were revised to use Containment ambient temperature to correctly indicate spray temperature when initiating auxiliary spray.

LER 97-022-02 was submitted to the NRC on November 26, 1997. An evaluation of the out-of-limit temperature differential identified in the LER was completed and documented. The results of the evaluation demonstrated that the structural integrity of the affected components had been maintained even after the increased temperature differentials were considered.

However, the evaluation determined that the original design compliance analysis did not consider the auxiliary spray actuation transients as specified in the design specification. Additionally, testing at a number of plants following issuance of NRC Bulletin 88-08 revealed thermal stratification in the horizontal piping just above the pressurizer. The new design transient needed to be addressed. This new condition was identified and required revision to the existing analysis to demonstrate design compliance. When the existing analysis was revised, insufficient margin remained for the most limiting component (a specially forged auxiliary spray to main spray tee connection). A design modification package was generated and implemented to replace those components that were not within the applicable design requirements.

Conclusion

The *Metal Fatigue of RCPB* 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.

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APPENDIX C AGING MANAGEMENT REVIEW METHODOLOGY

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C1.0 INTRODUCTION

The scoping effort (Section 2.1.4) identified the plant systems and structures that are within the scope of license renewal. For each of these systems and structures, screening was performed (Section 2.1.5) to identify the passive components and structural members that support a license renewal intended function. This appendix describes the methodology for performing the aging management review (AMR) of the long-lived passive components and structural members. Specifically, Section C2.0 provides an overview of the AMR process, including the process for identifying the in-scope passive components that are short-lived and, therefore, do not require an AMR. Section C3.0 provides a discussion of the aging effects and associated mechanisms evaluated for structures and components. Section C4.0 provides the results of a review of NUREG-0933.

A listing of the abbreviations used in this appendix is provided in Section 1.4.

C2.0 OVERVIEW OF THE AMR PROCESS

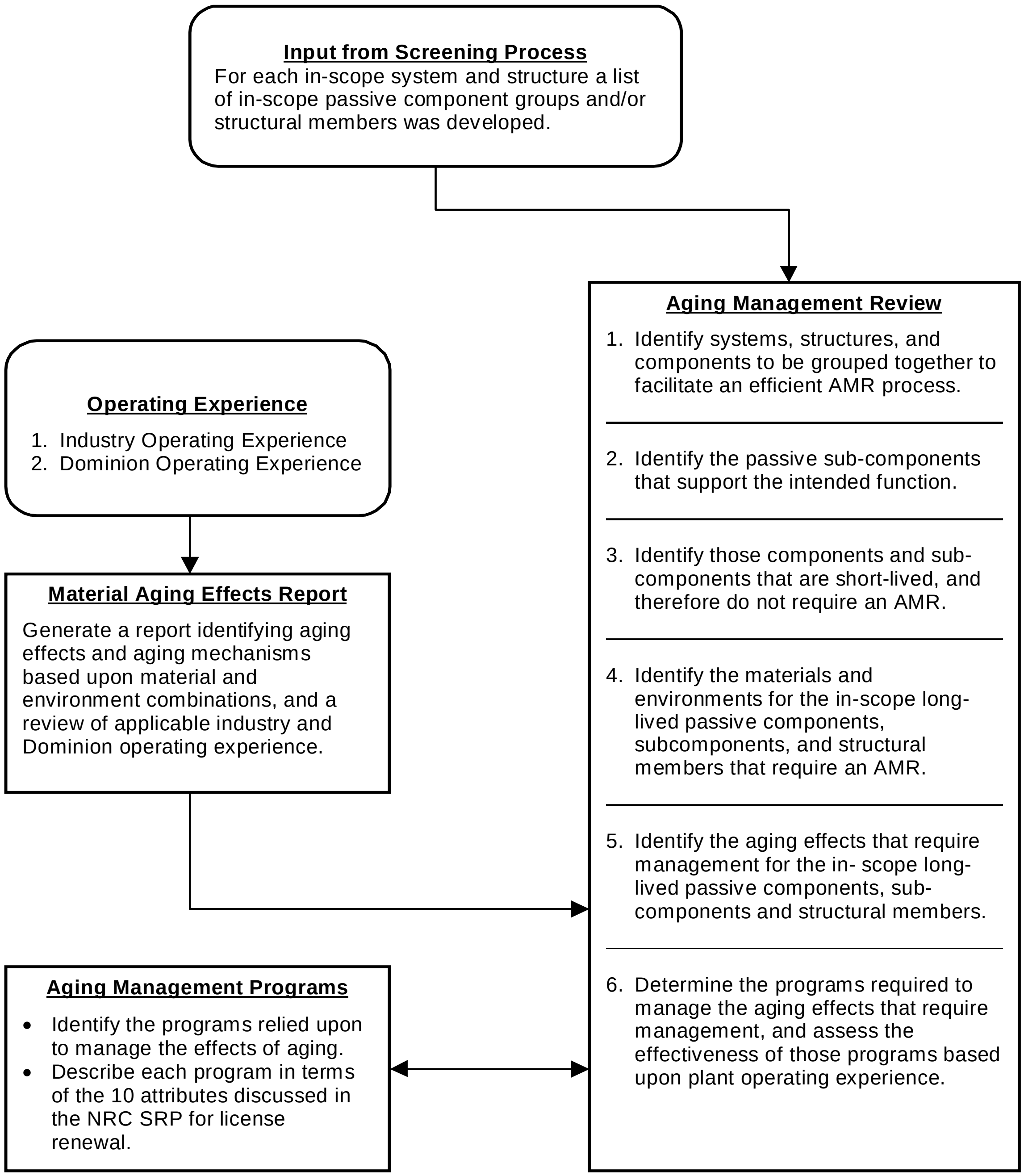
The aging management review process involved the following six (6) major steps:

1. Grouping of systems, structures, and components for evaluation
2. Identification of in-scope passive subcomponents
3. Identification of short-lived components and consumables
4. Identification of materials and environments
5. Identification of aging effects requiring management
6. Determination of the programs required to manage the effects of aging

These steps are discussed in Section C2.1 through Section C2.6, respectively. A simplified flow chart that illustrates the AMR process is provided in Figure C2.0-1.

The Dominion AMR process is consistent with the AMR process delineated in NEI 95-10 (Reference C-1).

Figure C2.0-1 Simplified AMR Process Flow Chart



C2.1 GROUPING OF SYSTEMS, STRUCTURES AND COMPONENTS FOR EVALUATION

The initial step of the AMR process involved the grouping of systems, structures, and components (SSCs) for the purpose of facilitating an efficient AMR process. The AMRs for SSCs have initially been divided into the following major divisions, consistent with the format of NUREG-1800 (Reference C-6):

Structure, System, or Component	AMR Results
Reactor Coolant System	Section 3.1
Engineered Safety Features	Section 3.2
Auxiliary Systems	Section 3.3
Steam and Power Conversion Systems	Section 3.4
Structures and Structural Components	Section 3.5
Electrical and I&C	Section 3.6

These major divisions were broken down further (where appropriate) into AMR groupings with similar materials and environments. Separate AMRs were also performed for the reactor vessel, reactor vessel internals, and steam generators, since these are major components with numerous subcomponents that require individual consideration.

Several terms are used to refer to plant equipment when addressing their form and function. For mechanical and electrical system equipment, the term "component group" is applied to system components. Examples of component groups include valves, pumps, pipe, tanks, filters/strainers, flow elements, tubing, and bolting. For buildings and structures, the term "structural member" is applied to the parts of a building or structure. Examples of structural members include walls, floor slabs, columns, and missile protection doors.

The aging management review for most component groups and structural members is performed on a system-by-system or structure-by-structure basis. However, the aging management review for some component groups and structural members that are common to many systems or structures has been performed on a plant-wide basis. For this situation, each component group or structural member evaluated is referred to as a "commodity". Examples of equipment evaluated as a commodity include general structural supports and other miscellaneous structural and electrical/I&C components, such as cable tray covers, fire/EQ barrier doors, penetration fire seals, cabinets, panels, cables, and connectors. The AMR results for systems and structures do not list commodities because commodities were evaluated separately in commodity AMRs.

NSSS equipment supports and load handling cranes and devices were also evaluated in separate AMRs.

C2.2 IDENTIFICATION OF IN-SCOPE PASSIVE SUBCOMPONENTS

The screening process identified the passive components and structural members within the scope of license renewal. That process, as described in Section 2.1.5, Screening Methodology, did not subdivide components into subcomponent parts. The screening of the subcomponent parts of in-scope components was accomplished in the AMR process.

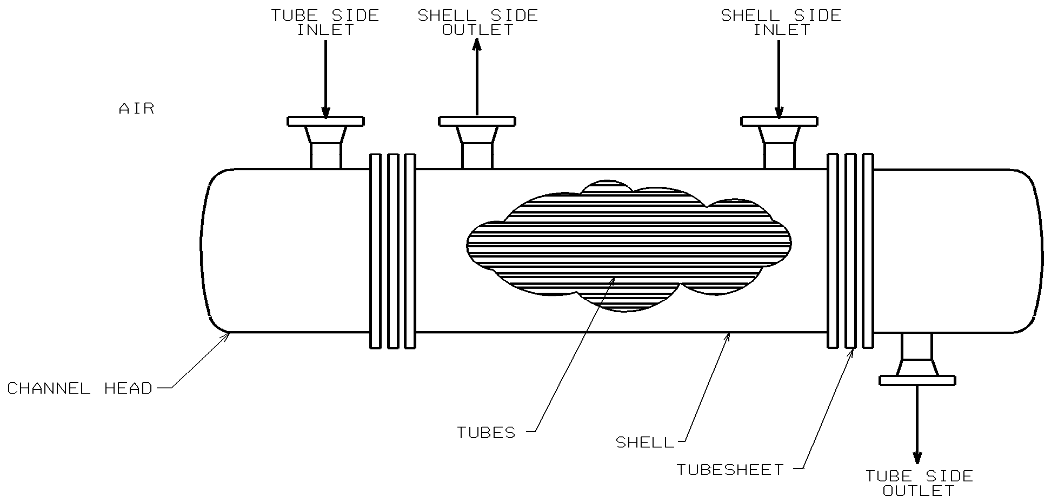
The reactor vessel, reactor vessel internals, and steam generators are major plant components with numerous subcomponents. Each of these components has been individually screened to identify the passive subcomponents that support an intended function of the component and, therefore, would require an aging management review.

Heat exchangers are comprised of a number of subcomponents potentially constructed of different materials and subject to different environments, as shown in Figure C2.2-1. The entire heat exchanger is included within the scope of license renewal, unless it can be shown that a particular subcomponent is not required to support the intended function(s) of the component. For example, the shell can be excluded in those instances where the only intended function is to maintain the pressure boundary for the tube side of the heat exchanger.

The typical heat exchanger has been divided into four subcomponents for the purposes of the aging management review: the channel head, the tubes, the tubesheet, and the shell. Each heat exchanger subcomponent is assigned an internal and an external environment. For the tubes and tubesheet heat exchanger subcomponents, the tube-side is considered the internal environment and the shell-side is considered the external environment. The assignment of environments in this manner results in internal system environments defined in Table 3.0-1, Internal Service Environments, assigned as external environments for the tubes and tubesheet subcomponents. Heat exchanger subcomponents are evaluated together and the AMR results are reported based on the system designator for the heat exchanger.

Although most heat exchangers were divided according to the convention described above, certain non-shell-and-tube type heat exchangers require special handling for identification of subcomponents and do not conform to this typical example. In these instances (such as cooling coils), there may be less than four subcomponents identified for the aging management review.

Figure C2.2-1 Simplified Shell-and-Tube Heat Exchanger



Components such as pipe, pumps, and valves are generally less complex, but still may have more than one subcomponent. The “Pipe” component group includes piping and all of the associated fittings, since fittings generally are of the same material as the piping and are subject to the same environmental conditions. Subcomponents such as packing, gaskets, component seals, O-rings, oil, grease, and component filters have generally been treated as consumables and have been evaluated as explained in Section C2.3, Identification of Short-lived Components and Consumables.

Bolting applications within the scope of license renewal are divided into pressure boundary bolting and structural bolting.

Pressure boundary bolting applications include bolted flange connections for vessels (i.e., manways and inspection ports), flanged joints in piping, body-to-bonnet joints in valves, and pressure-retaining bolting associated with pumps and miscellaneous process components. Pressure boundary bolting includes nuts, bolts, studs, and cap screws.

Plant Technical Specifications maintain strict leakage controls on the reactor coolant pressure boundary so that leakage can be quickly identified and accounted for during plant operations. As such, fasteners used in systems to maintain the reactor coolant pressure boundary (i.e., ASME Class 1) warrant additional assurances inherent in nuclear safety beyond those required for ASME Class 2, 3, and Non Class system fasteners. Therefore, bolting is uniquely identified for Class 1 pressure boundary applications. Additionally, Dominion has uniquely identified bolting for systems constructed primarily of stainless steel because of the susceptibility of low-alloy steel bolting to boric acid wastage.

Bolting used in other pressure boundary applications has been evaluated as part of the larger host component and has not been uniquely identified in the LRA. For these applications, the aging management reviews performed for the host components are based on materials of construction that bound the bolting material.

Structural bolting applications include bolted joints and threaded connections for structural steel and steel components used in the construction of building structures, mechanical and electrical component supports, and other structural members. Structural bolting includes bolts, studs, nuts, screws, and anchorage to concrete. Bolting used in structural applications has been evaluated as part of the structural component and has not been uniquely identified in the LRA.

C2.3 IDENTIFICATION OF SHORT-LIVED COMPONENTS AND CONSUMABLES

The screening process identified the passive components and structural members within the scope of license renewal. That process, as described in Section 2.1.5, Screening Methodology, did not attempt to identify those components that are short-lived. These determinations were made during the AMR process. If a component is subject to periodic replacement, or the component was found to have an established qualified life (e.g., for EQ purposes), the component was determined to be short-lived and does not require an aging management review.

Consumables are a special class of short-lived items that can include packing, gaskets, component seals, O-rings, oil, grease, component filters, system filters, fire extinguishers, fire hoses, and air packs. Many types of consumables are part of a component such as a valve or a pump and, therefore, have not been identified during screening. Items potentially treatable as consumables were evaluated consistent with the information presented in Reference C-2. The results of that evaluation are presented below.

Packing, Gaskets, Component Seals, and O-Rings

Packing, gaskets, component seals, and O-rings are typically used to ensure leak-proof seals when components are mechanically joined together. These items are commonly found in components such as valves, pumps, heat exchangers, ventilation units, ducts, and piping segments. These items are considered subcomponents of the identified components. Unless they are replaced on a fixed frequency, have an established qualified life (e.g., for EQ purposes), or are replaced based on performance or condition monitoring, it is not appropriate to classify them as short-lived.

ASME Section III generally excludes these items if they do not perform a pressure boundary function. Thus, these types of sealing devices are not in-scope unless they are relied upon to maintain the following conditions in accordance with the CLB:

- Leakage below established limits
- System pressure high enough to deliver specified flow rates
- A pressure envelope for a space

Oil, Grease, and Component Filters

Oil, grease, and component filters are required to support the intended functions of the systems or components in which they are installed. Per the NRC guidance (Reference C-2), these consumables are considered short-lived and periodically replaced and, therefore, do not require aging management review.

System Filters, Fire Extinguishers, Fire Hoses, and Air Packs

These consumable items are in the scope of license renewal because they are either safety-related or because they are relied on for fire protection (i.e., fire extinguishers, fire hoses, and air packs). As identified in NRC guidance (Reference C-2), there are specific standards that provide effective guidance for monitoring these components; that is, the onset of degradation can be detected and replacement requirements can be imposed before there is a loss of intended function.

Components such as fire hoses, fire extinguishers, self-contained breathing apparatus (SCBA), and SCBA cylinders are considered to be consumables that are routinely tested or inspected. The Fire Protection Program complies with the applicable safety standards, which specify performance and condition monitoring programs for these specific components. Fire hoses and fire extinguishers are inspected and tested periodically and must be replaced if they do not pass the test or inspection. SCBA and SCBA cylinders are inspected and periodically tested and must be replaced if they do not pass the test or inspection. The Fire Protection Program determines the replacement criteria of these components that are routinely checked by tests or inspections to assure operability. Therefore, while these consumables are in the scope of license renewal, they do not require aging management review.

Structural Sealants

Structural sealants are associated with structural members such as fire barriers, flood barriers, etc. These types of sealants historically are not replaced on a fixed interval and do not have established qualified lives. Therefore, they were treated as long-lived items and subject to aging management review.

C2.4 IDENTIFICATION OF MATERIALS AND ENVIRONMENTS

The fourth step of the AMR process involved the identification of the materials of construction and the service environments for the components and structural members that require an AMR.

Materials were identified by consulting documentation sources such as equipment specifications, purchase orders, vendor manuals, and drawings. The materials are documented in the AMR report and presented in Section 3.0, Aging Management Review Results, of the application.

Some components contain internal or external coatings or linings. Although these features may serve to limit material exposure to environmental stressors, they were not credited for the determination of aging effects requiring management.

The service environments include the conditions known to exist on a recurring basis based on operating experience. Descriptions of the internal and external service environments which were used in the aging management review to determine aging effects requiring management are included in Table 3.0-1, Internal Service Environments and Table 3.0-2, External Service Environments. The general environments of individual components, subcomponents, and structural members were documented in the applicable AMR report and presented in Section 3.0, Aging Management Review Results. For example, the fluids internal to plant systems are generally characterized as raw water, treated water, etc. However, in many instances, the aging effects considered were dependent on specific environmental parameters, such as the fluid temperature, fluid flowrate, chloride concentrations, accumulated radiation exposure, and intermittent wetting. Therefore, when required, the environments that come in contact with the equipment (internal and external) were further characterized in the AMR report in terms of chemistry parameters, temperature, flow rates, etc.

Embedded steel exists in concrete structural components as reinforcement, embedded bolting for anchorage (a portion of the bolt is embedded), embedded structural shapes for anchorage, wall penetration sleeves, and piping. The embedded steel is surrounded by the concrete and is considered to be an integral part of the concrete. Therefore, embedded steel was evaluated along with the concrete in which it exists. This evaluation considered the alkalinity of the surrounding concrete, and its associated low potential for corrosion of steel, when determining aging effects for the embedded steel. In addition, the external environment for the concrete, such as air, soil, or groundwater, that could lead to loss of material and cracking of the concrete was considered for its affect on the embedded steel environment. The result of this review is documented in Section C3.3.3, Corrosion of Embedded Steel – Concrete. The protruding portion of the embedded steel was evaluated for exposure to appropriate environments (such as air, borated water leakage, etc.) as any other structural steel in the IPA process.

Waterstops are generally provided in structures along the junctions of the foundation mat and concrete walls, at each vertical construction joint, and in the seismic gap space. In these applications, waterstops are not defined as unique components, but are considered part of these concrete structural members.

The surfaces of the carbon steel or low-alloy steel subcomponents in direct contact with the primary coolant are clad with a weld overlay of stainless steel, with the exception of selected locations that are clad with nickel-based alloy. The cladding is considered a design feature for corrosion control and is included for completeness. The metal-to-metal interface between the cladding and the carbon steel or low-alloy steel was not evaluated for age-related degradation because of the material compatibility.

C2.5 IDENTIFICATION OF AGING EFFECTS REQUIRING MANAGEMENT

The fifth step in the AMR process involved the identification of the aging effects requiring management. To ensure consistency throughout the AMR process, the aging effects requiring management were incorporated into a MAER. The MAER incorporated aging effects based upon industry operating experience and Dominion operating experience. The aging effects are presented in terms of the material and environment combinations that are expected in the plant. Therefore, the information is applied to plant equipment regardless of form (i.e., piping, pumps, valves, tanks, structural beams, etc.). The environments considered in the MAER are the environments that components, subcomponents, and structural members experience during routine operation. Environmental stressors that are not conditions normally experienced by equipment, or that may be caused by a design problem (such as vibration-induced fatigue), are considered event-driven conditions and have not been characterized as sources of aging as discussed in Section C3.0, Aging Effects.

Although aging mechanisms are not required to be addressed in a license renewal application, aging effects are the manifestation of aging mechanisms. To effectively manage an aging effect, it is necessary to first determine the aging mechanisms that are potentially at work for a given equipment application. Therefore, the AMR process addressed both the aging effects and the associated aging mechanisms.

The MAER was used in the development of AMRs to identify the aging effects that require management for in-scope, long-lived, passive components and structural members. If a plant material-environment combination was not addressed in the MAER, a review of Dominion operating experience and other industry sources was initiated to identify any aging effects that require management. Where appropriate, the MAER was revised to incorporate the information from those sources.

The applicability of each aging mechanism and effect identified in the MAER was evaluated and a summary of the review is presented in the AMR report. Justification was provided for any aging mechanisms and effects that were determined not to require aging management.

The Dominion positions on the aging effects of potential concern are presented in Section C3.0, Aging Effects.

C2.6 DETERMINATION OF THE PROGRAMS REQUIRED TO MANAGE THE EFFECTS OF AGING

The sixth step in the AMR process involved the determination of the aging management programs (AMPs) to be credited for managing the effects of aging, and a demonstration of the effectiveness of those AMPs.

C3.0 AGING EFFECTS

Aging effects were determined based on materials and environments. Aging effects are considered to require management if the effects could potentially cause the loss of intended function during the period of extended operation. This section describes the aging effects and the associated aging mechanisms that have been evaluated.

C3.1 CHANGE IN DIMENSIONS

Change in dimensions due to void swelling is an aging effect associated with the reactor vessel internals.

C3.1.1 VOID SWELLING – METALS

Void swelling is defined as a gradual increase in the dimension of a subcomponent as the result of helium bubble nucleation and growth from nuclear transmutation reactions of nickel and boron in the material. The helium bubbles have a diameter of 2 to 3 nanometers or less, but at sufficiently high temperatures, they can grow to a critical diameter larger than 4 nanometers. This growth results in voids that cause swelling of the material. The irradiation flux level, the alloy composition, and the irradiation temperature affect the degree of void nucleation and growth. Welds that might be part of the irradiated material could be affected by the helium bubbles.

Industry data is currently being evaluated as part of the Electric Power Research Institute (EPRI) Material Reliability Project with respect to void swelling. At present, there have been no indications from the different reactor vessel internals bolt removal programs, or from any of the other inspection and functional evaluations (e.g., refueling), that there are any discernible effects attributable to void swelling. However, an industry initiative to consider the accumulated data, engineering evaluations of the ramifications of void swelling, and field observations is presently underway.

This aging mechanism was evaluated during the aging management reviews.

C3.2 CHANGE IN MATERIAL PROPERTIES

Aggressive chemical attack, alkali (cement)-aggregate reaction, conversion, elevated temperatures, leaching of calcium hydroxide, irradiation, and thermal exposure can each cause a change in material properties.

C3.2.1 AGGRESSIVE CHEMICAL ATTACK – CONCRETE

Aggressive chemical attack involves degradation of concrete by chemical agents that attack the concrete matrix, causing staining, material loss, cracking, and/or spalling. Acid attack may increase porosity and permeability of concrete, reduce strength, and render the concrete susceptible to further deterioration. Below grade, sulfate solutions of sodium, potassium, and magnesium may attack concrete, often in combination with chlorides. Continued or frequent cyclic exposure to acidic solutions with a pH <5.5, chloride solutions >500 ppm, and sulfate solutions >1500 ppm is necessary to cause significant degradation.

This aging mechanism was evaluated during the aging management reviews.

C3.2.2 ALKALI (CEMENT)-AGGREGATE REACTION – CONCRETE

Alkali (cement)-aggregate reaction causes internal expansion stresses in concrete, which can result in internal decomposition, cracking, and reduced strength. Operating history does not indicate that alkali (cement)-aggregate reaction is a prevalent phenomenon at nuclear power facilities. Alkali (cement)-aggregate reactions are not significant for aggregates that are investigated, tested, and subject to petrographic examination conducted in accordance with ASTM-C295 (Reference C-12) or ASTM-C227 (Reference C-13), and are shown to be non-reactive. Alternatively, the aggregate may be designated potentially reactive; however, if the provisions of ACI-201-2R-77 (Reference C-10) (or later versions of this code) are followed, the alkali (cement)-aggregate reactions are not significant.

This aging mechanism was evaluated during the aging management reviews.

C3.2.3 ELEVATED TEMPERATURES – CONCRETE

Long-term exposure to elevated temperatures in excess of 300°F may cause surface scaling and cracking of concrete. Elevated temperatures may cause changes in the material properties of concrete. The compressive strength, tensile strength, and modulus of elasticity are reduced when concrete is exposed to temperatures exceeding 150°F (general) area or 200°F (localized) for prolonged periods. Degradation resulting from exposure to an elevated temperature is insignificant for embedded reinforcing steel in concrete structures that remain below 600°F.

This aging mechanism was evaluated during the aging management reviews.

C3.2.4 IRRADIATION – NON-METALLIC MATERIALS

For ceramics and polymers, the gamma radiation threshold value is the radiation dose at which at least one of the material's physical properties begins to change. The reported radiation damage threshold value for organic polymers of 10^6 rads is conservative for fire wrap and fire stop material (Bisco SF-20 silicone foam, for example, resists radiation effects up to 2 X 10^8 rads) and radiation may not affect the fire-retarding properties of fire wrap or fire stop materials at these levels. Therefore, radiation-induced change in material properties is not an aging effect for fire wrap and fire stops, provided the radiation dose is below 10^6 rads.

As a general rule, cable organic materials exposed to total gamma doses less than 100K Rad will experience little or no aging from radiation exposure.

Ionizing radiation can profoundly alter the molecular structure and macroscopic properties of elastomers. Effects of radiation-induced degradation of elastomers may include embrittlement and cracking or crazing. Rubber, neoprene, and silicone elastomers ultimately become harder, stiffer, and eventually brittle, when exposed to significant radiation. The gamma radiation threshold value of 1 x 10^6 rads is used for all elastomers, except rubber and nitrile rubber. The threshold value of 1 x 10^7 rads is used for rubber and nitrile rubber.

The threshold value of 1 x 10^4 rads is used for Teflon.

This aging mechanism was evaluated during the aging management reviews.

C3.2.5 LEACHING OF CALCIUM HYDROXIDE – CONCRETE

The loss of certain salts, including calcium hydroxide, from the concrete matrix by exposure to flowing or penetrating water, can reduce the strength of concrete. Leaching typically is a concern associated only with low-density or porous concrete. Since Seismic Class I concrete components utilize high density, low-permeability concrete, and proper arrangement and distribution of reinforcement to control cracking in accordance with the guidance of ACI 201.2R-77 (Reference C-10) (or later versions of this code); leaching does not result in an aging effect requiring management for Seismic Class I concrete components, except low-density or porous concrete.

This aging mechanism was evaluated during the aging management reviews.

C3.2.6 THERMAL EXPOSURE – NON-METALLIC MATERIALS

Thermal exposure of elastomers to temperatures greater than 95°F can result in decreased tensile strength and decreased elongation, increased cracking, cross-linking, or chain scission. Cross-linking refers to the process in which long chain molecules typically present in elastomers are bonded together. Excessive cross-linking makes the elastomers brittle, increases the modulus of elasticity, and promotes surface cracking. Chain scission is the breaking of chemical bonds in elastomers, which usually results in reduced tensile strength and modulus of elasticity.

Thermal influences that may induce aging effects on the organic cable components or associated terminations may result from general area ambient temperatures, localized high temperatures, or internal resistive (ohmic) heating due to current flow within the conductors. Localized high temperatures resulting from occurrences such as steam leaks or damaged or missing thermal insulation are considered events and are not considered for long-term aging effects. General area temperatures and ohmic heating do provide sources of thermal stress for long-term aging effects.

Thermal exposure of the organic compounds used for electric conductor insulation can result in decreased tensile strength or ultimate elongation, cracking, crazing, cross-linking, or chain scission. Cross-linking in electric conductor insulation refers to the process where the long chain molecules typically present in organic cable insulation compounds are joined with covalent bonds. Cross-linking generally results in increased tensile strength and hardening of the material. This hardening decreases material flexibility and elongation at the break, which can increase the susceptibility to cracking and crazing. Chain scission in electric conductor insulation is the breaking of the long chain molecules into smaller pieces. Chain scission may reduce tensile strength and increase elongation.

This aging mechanism was evaluated during the aging management reviews.

C3.3 CRACKING

Cracking is the non-ductile failure of a component due to stress corrosion, flaw initiation and growth, settlement, dry shrinkage, freeze-thaw, expansion or contraction, creep/stiffness variation, aggressive chemical attack, alkali (cement)-aggregate reaction, corrosion of embedded steel, conversion, elevated temperatures, irradiation, separation, thermal exposure, ultraviolet radiation and ozone, differential movement, shrinkage, or vibration.

The analysis of the potential for cracking due to metal fatigue is a time-limited aging analysis and is addressed in Section 4.3, Metal Fatigue. Other aging mechanisms that can lead to cracking are discussed below.

C3.3.1 AGGRESSIVE CHEMICAL ATTACK – CONCRETE

Aggressive chemical attack involves the degradation of concrete by chemical agents that attack the concrete matrix, causing staining, material loss, cracking, and/or spalling. Acid attack may increase the porosity and permeability of concrete, may reduce strength, and may render the concrete susceptible to further deterioration. Below grade, sulfate solutions of sodium, potassium, and magnesium may attack concrete, often in combination with chlorides. Continued or frequent cyclic exposure to acidic solutions with a pH <5.5, solutions with >500 ppm chlorides, or solutions with >1500 ppm sulfate environments is necessary to cause significant degradation due to aggressive chemical attack.

This aging mechanism was evaluated during the aging management reviews.

C3.3.2 ALKALI (CEMENT)-AGGREGATE REACTION – CONCRETE

Alkali (cement)-aggregate reaction causes internal expansion stresses in concrete, which can result in internal decomposition, cracking, and reduced strength. Industry operating experience does not indicate that alkali (cement)-aggregate reaction is a prevalent phenomenon in nuclear power facilities. Alkali (cement)-aggregate reactions are not significant in aggregates that are investigated, tested, and subject to petrographic examinations conducted in accordance with ASTM-C295 (Reference C-12) or ASTM-C227 (Reference C-13), and that are shown to be non-reactive. Alternatively, the aggregate may be designated potentially reactive; however, if the provisions of ACI-201-2R-77 (Reference C-10) (or later versions of this code) are followed, the alkali (cement)-aggregate reactions are not significant.

This aging mechanism was evaluated during the aging management reviews.

C3.3.3 CORROSION OF EMBEDDED STEEL – CONCRETE

Corrosion of embedded steel can cause cracking, spalling, loss of bond, and loss of concrete material. Corrosion of embedded steel may be applicable to the surfaces of the steel that are in direct contact with concrete. Embedded steel is defined as those items that were installed while the concrete (or grout) was in a plastic state. Examples of embedded steel are reinforcing steel, plates, and anchor bolts.

The high alkalinity (i.e. pH >12.5) of the concrete provides an environment which helps protect the embedded steel from corrosion. However, when the pH is reduced by the intrusion of aggressive ions, corrosion can occur. Degradation due to corrosion of embedded steel is non-significant for concrete structures not exposed to an aggressive environment for extended periods. An aggressive environment is defined as pH <11.5 for the environment within concrete directly surrounding embedded steel, pH <5.5 for the environment adjacent to concrete, chlorides >500 ppm, or sulfates >1500ppm. If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete has a low water-to-cement ratio (0.35 to 0.45), adequate air entrainment (3% to 6%), and is designed in accordance with ACI 318-63 (Reference C-8) or ACI 349-85 (Reference C-12) (or later versions of this code). These provisions ensure adequate concrete cover, low permeability, and proper reinforcement distribution, which will minimize corrosion of embedded steel and the resultant potential for concrete crack development.

This aging mechanism was evaluated during the aging management reviews.

C3.3.4 CREEP/STIFFNESS VARIATION – CONCRETE

If proper isolation is not provided at the joint between the masonry block wall and the supporting structures and structural members, long-term creep and variation in stiffness in the supporting structures and structural members could cause cracking of masonry block walls.

This aging mechanism was evaluated during the aging management reviews.

C3.3.5 DIFFERENTIAL MOVEMENT – NON-METALLIC MATERIALS

Differential movement of the fire barriers may cause cracking of fire wrap material if it is attached independently to separate support structures for the wrapped component. This condition is precluded in design and by initial fire proofing inspections. Sprayed-on fire proofing is not affected, since it is applied to structural components that do not experience differential movements during normal plant operation. Therefore, cracking due to movement is not an applicable aging effect for fire wrapping. Differential movement may initially affect fire stops between adjacent structures. Cracking of fire stops due to differential movement is an applicable aging effect.

This aging mechanism was evaluated during the aging management reviews.

C3.3.6 DRY SHRINKAGE – CONCRETE

Dry shrinkage is the main cause of volume changes in masonry block walls. The type of aggregate used, the method of curing, and the methods of storage are the factors that affect dry shrinkage. Blocks made with sand and gravel aggregate normally exhibit the least shrinkage. High-pressure steam curing and proper drying of concrete masonry blocks reduce the potential shrinkage of the walls. Improper aggregate content or lack of curing can cause cracking of masonry walls.

This aging mechanism was evaluated during the aging management reviews.

C3.3.7 ELEVATED TEMPERATURES – CONCRETE

Long-term exposure to elevated temperatures in excess of 300°F may cause surface scaling and cracking of concrete. Degradation from exposure to elevated temperatures is insignificant for embedded reinforcing steel used in concrete structures that remain below 600°F.

This aging mechanism was evaluated during the aging management reviews.

C3.3.8 EXPANSION OR CONTRACTION – CONCRETE

Restraints on a block wall may prevent the wall from freely expanding or contracting and, thereby, induce stresses that may result in cracking within the wall. Restraints against expansion generally result in stresses that are small compared to the strength of the wall and, therefore, rarely cause degradation. Restraints against free contraction are much more likely to cause cracks.

This aging mechanism was evaluated during the aging management reviews.

C3.3.9 FLAW INITIATION AND GROWTH – METALS

Growth of flaws related to fatigue, stress-corrosion, and original manufacturing defects caused by service loading over time can cause cracking. The detection and evaluation of flaws is important in maintaining the structural integrity of the reactor coolant Class 1 pressure boundary. ASME Section XI inservice examinations of components are intended to detect significant flaw growth and development. Flaw initiation and growth is evaluated and managed only for the reactor coolant Class 1 pressure boundary and specific Class 2 components (on the secondary side of the steam generators).

Inservice inspections are performed to detect flaws prior to the loss of a component intended function. The examinations required by ASME Section XI utilize visual, surface, and volumetric inspections. Components whose examination confirms the absence of flaws are deemed acceptable for continued service. However, flaws exceeding ASME Section XI allowable flaw size require corrective action.

This aging mechanism was evaluated during the aging management reviews.

C3.3.10 FREEZE-THAW – CONCRETE

Freeze-thaw degradation occurs as the result of repetitive freezing and thawing of free water that has permeated the concrete. The result can be cracking, spalling, crumbling, scaling, and exposure of aggregate and reinforcing bar. Resistance to freeze-thaw is dependent on the amount of entrained air and the permeability of the concrete. Freeze-thaw is not applicable for concrete structures if the concrete is of an appropriate mix and construction quality. Concrete structures designed and constructed in accordance with Codes ACI 318-63 (Reference C-8) and ACI 301-66 (Reference C-9) (or later versions of these codes) provide for low permeability and adequate air entrainment such that the concrete will not be susceptible to freeze-thaw cracking effects.

This aging mechanism was evaluated during the aging management reviews.

C3.3.11 IRRADIATION – NON-METALLIC MATERIALS

Ionizing radiation can profoundly alter the molecular structure and macroscopic properties of elastomers. Effects of radiation-induced degradation of elastomers may include embrittlement and cracking or crazing. Rubber, neoprene, and silicone elastomers ultimately become harder, stiffer, and eventually brittle, when exposed to significant radiation.

As a general rule, cable organic materials exposed to total gamma doses less than 100K Rad will experience little or no aging from radiation exposure.

This aging mechanism was evaluated during the aging management reviews.

C3.3.12 SEPARATION - NON-METALLIC

Cracking due to separation can occur in laminated wood products. The bonding agent can break down due to environmental conditions and insect infestation, resulting in separation cracking.

This aging mechanism was evaluated during the aging management reviews.

C3.3.13 SETTLEMENT – CONCRETE

Building settlement occurs as a result of the consolidation, movement, or liquefaction of soils on which the structure is founded. Ongoing settlement may be observed in the form of active structural cracking or as differential movements of structures or the piping and conduits passing between the affected structures. Settlement cracking is a concern when structures are located on soil.

This aging mechanism was evaluated during the aging management reviews.

C3.3.14 SHRINKAGE – NON-METALLIC MATERIALS

Shrinkage may occur over time where fire penetration seal material is exposed to pipe surfaces. Shrinkage has been observed with silicone foam seal material used for fire stops. Therefore, cracking due to shrinkage is an applicable aging effect for fire stops.

This aging mechanism was evaluated during the aging management reviews.

C3.3.15 STRESS-CORROSION CRACKING – METALS

Stress-corrosion cracking (SCC) is an aging mechanism that requires the simultaneous action of a corrosive environment, sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate the susceptibility to SCC. Cracking can occur along the material grain boundaries, which is designated as intergranular stress-corrosion cracking (IGSCC); across the material grains, which is designated as transgranular stress-corrosion cracking (TGSCC); or both. SCC also can occur as primary-water stress-corrosion cracking (PWSCC) in steam generator tubing or austenitic stainless steels. Exposure to high neutron fluence can lead to irradiation-assisted stress-corrosion cracking (IASCC).

Intergranular attack (IGA) is similar to SCC, but it can occur without the presence of stress.

For austenitic stainless steel, SCC can occur at a temperature as low as 140°F (for sensitized material, the temperature threshold is considered to be ambient). SCC can occur in raw water or high-purity water, if the oxygen concentration exceeds 100 ppb, or at lower oxygen concentrations in the presence of impurities such as sulfates (100 ppb), chlorides (150 ppb), or fluorides (150 ppb). While susceptibility to SCC exists for austenitic stainless steel and cast austenitic stainless steel at the conditions listed above, nickel-based alloys also can experience SCC at the same conditions. However, the temperature threshold for SCC to occur in nickel-based alloys is at a significantly higher value of 500°F.

SCC can occur in air/gas or atmospheric/weather environments with cyclic or intermittent wetting for sensitized austenitic stainless steel. SCC is not considered an applicable aging mechanism for non-sensitized stainless steel in an air/gas or atmospheric/weather environment.

Although there have been instances of cracking of carbon steel and low-alloy steel bolting in the industry due to SCC, these failures have been attributed to bolting materials with high yield strength (>150 ksi), leaking gaskets, and the exposure to contaminants, such as lubricants containing molybdenum disulfide. For quenched and tempered low-alloy steels (e.g., SA193 Grade B7) used for closure bolting material, susceptibility to SCC is controlled through the proper use of approved tensioning techniques, lubricants, and sealant, based on NRC guidance provided in Information Bulletin 82-02 (Reference C-3) and Generic Letter 91-17 (Reference C-4) and other industry initiatives in this area. Therefore, SCC is not evaluated for closure bolting applications.

In selected structural bolting applications, bolting material with estimated maximum yield strength that exceeds the 150 ksi value is used. The aging management reviews for this bolting concluded that based on marginally susceptible bolting materials and a dry, non-conducive service environment, cracking due to SCC is not an aging effect requiring management for this bolting.

This aging mechanism was evaluated during the aging management reviews.

C3.3.16 THERMAL EXPOSURE – NON-METALLIC MATERIALS

Thermal exposure of elastomers to temperatures greater than 95°F can result in decreased tensile strength or ultimate elongation, cracking, cross-linking, or chain scission. Cross-linking refers to the process where long chain molecules typically present in elastomers are bonded together. Cross-linking makes the elastomers brittle, increases the modulus of elasticity, and promotes surface cracking. Chain scission is the breaking of chemical bonds in elastomers, which usually results in reduced tensile strength and modulus of elasticity.

Thermal influences that may induce aging effects on organic cable components or associated terminations may result from general area ambient temperatures, localized high temperatures, or internal resistive (ohmic) heating due to current flow within the conductors. Localized high temperatures resulting from occurrences such as steam leaks or damaged or missing thermal insulation are considered events and are not considered for long-term aging effects. General area temperatures and ohmic heating do provide sources of thermal stress for long-term aging effects.

Thermal exposure of the organic compounds used for electric conductor insulation can result in decreased tensile strength or ultimate elongation, cracking, crazing, cross-linking, or chain scission. Cross-linking in electric conductor insulation refers to the process where the long chain molecules typically present in organic cable insulation compounds are joined with covalent bonds. Cross-linking generally results in increased tensile strength and hardening of the material. This hardening decreases material flexibility and elongation at the break, which can increase the susceptibility to cracking and crazing. Chain scission in electric conductor insulation is the breaking of the long chain molecules into smaller pieces. Chain scission may reduce tensile strength and increase elongation.

This aging mechanism was evaluated during the aging management reviews.

C3.3.17 ULTRAVIOLET RADIATION AND OZONE – NON-METALLIC MATERIALS

Rubber is decomposed by exposure to ultraviolet radiation. Ultraviolet radiation includes solar radiation and ultraviolet or fluorescent lamps. The deterioration of rubber is greatly accelerated in the presence of oxygen. Cracking and checking, which may occur when rubber is exposed to air and sunlight, are due mainly to reaction with ozone. Neoprene and nitrite rubber have good resistance to sunlight and ozone, and silicone and butyl rubber are relatively unaffected by sunlight and ozone.

Exposure to ultraviolet radiation and ozone can also 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 sunlight or high levels of ozone, which might be found in conjunction with high-voltage electrical equipment, would be most prone to this effect. Exposure to indoor ambient lighting and normal environmental ozone is not a concern.

This aging mechanism was evaluated during the aging management reviews.

C3.3.18 VIBRATION

Mechanical fatigue resulting from vibration has been observed in the nuclear industry and can result in crack initiation/growth. Vibration-induced fatigue is fast acting and is typically detected early in a component's life, and corrective actions are initiated to effect repairs and prevent recurrence. Corrective actions involve design modifications to the plant, such as the addition of supplemental restraints to a piping system, replacement of tubing with flexible hose, etc. Proper design minimizes or eliminates anticipated vibration.

Components and component supports may be subjected to vibratory or cyclic loading. This vibration characteristically leads to support degradation, such as concrete cracking around anchor bolts. Support degradation will occur early in the operational life of the support and is identified and corrected through design modifications to prevent recurrence. Proper design eliminates or compensates for vibration and cyclic loading.

Since these sources of vibration are design considerations, cracking due to vibration is not an applicable aging mechanism for mechanical systems and component supports.

Some vibration sources cannot be abated through design. In these situations, vibration may cause degradation over time. Fire wrap and fire stop materials are subject to cracking due to vibration. Cracking will most likely appear in sprayed-on fire proofing that protects steel floor beams and floor decking. Cracking may also form in fire-stop silicone rubber and foams. Over time, the vibration of steel members and decks under rotating equipment or other sources of vibration may break down the bond between steel and fire proofing, causing cracks to form. Fatigue-based splits may form in flexible fire stop material from the same environment. These degradations may reduce the protective capacity of the fire proofing and may result in inadequate protection of structural components or allow fire and/or hot gases to spread across firewall penetrations. Therefore, cracking due to vibration was evaluated during the aging management reviews for fire wraps and fire stops.

C3.4 EMBRITTLEMENT

Embrittlement can be caused by irradiation or thermal exposure.

C3.4.1 IRRADIATION – NON-METALLIC MATERIALS

The two forms of radiation that are of most concern for electrical/I&C components are gamma and neutron radiation. Radiation interacts with matter in two principal ways: ionization/excitation of atoms in the material (radiolysis) and displacement of atoms or subatomic particles, thereby altering the molecular structure of the material. Both processes are applicable to radiation-induced degradation, however, displacement effects are usually not significant in organic materials because of their less rigid molecular structure and covalent bonding. Similarly, ionizing effects have little impact on inorganic materials because of their ionic bonding and rigid or crystalline structure. In general, radiation effects are much more severe on organic materials than on inorganic materials. Neutron radiation is of the most concern when associated with inorganic and metallic materials. Radiation incident on cable organic components produces degradation through scission, oxidation, or cross-linking of polymer chains. This process is generally known as radiolysis.

As a general rule, cable organic materials exposed to total gamma doses less than 100K Rad will experience little or no aging from radiation exposure.

This aging mechanism was evaluated during the aging management reviews.

C3.4.2 THERMAL EXPOSURE – NON-METALLIC MATERIALS

Thermal exposure of elastomers to temperatures greater than 95°F can result in decreased tensile strength or ultimate elongation, cracking, cross-linking, or chain scission. Cross-linking refers to the process in which long chain molecules typically present in elastomers are bonded together. Cross-linking makes the elastomers brittle, increases the modulus of elasticity, and promotes surface cracking. Chain scission is the breaking of chemical bonds in elastomers, which usually results in reduced tensile strength and modulus of elasticity.

Thermal influences that may induce aging effects on the organic cable components or associated terminations may result from general area ambient temperatures, localized high temperatures, or internal resistive (ohmic) heating due to current flow within the conductors. Localized high temperatures resulting from occurrences such as steam leaks or damaged or missing thermal insulation are considered events and are not assessed for long-term aging effects. General area temperatures and ohmic heating provide the sources of thermal stress for long-term aging effects.

Thermal exposure of the organic compounds used for electric conductor insulation can result in decreased tensile strength or ultimate elongation, cracking, crazing, cross-linking, or chain scission. Cross-linking in electric conductor insulation refers to the process where the long chain molecules typically present in organic cable insulation compounds are joined with covalent bonds. Cross-linking generally results in increased tensile strength and hardening of the material. This hardening decreases material flexibility and elongation at the break, which can increase the susceptibility to cracking and crazing. Chain scission in electric conductor insulation is the breaking of the long chain molecules into smaller pieces. Chain scission may reduce tensile strength and increase elongation.

This aging mechanism was evaluated during the aging management reviews.

C3.5 FORMATION OF WATER TREES

Formation of water trees is an aging effect requiring management.

C3.5.1 WATER TREEING – NON-METALLIC MATERIALS

Water treeing is a long-term phenomenon that has been documented for medium voltage cables with certain extruded polyethylene insulations. For the Millstone aging management reviews, medium voltage cable applications include voltages in the range of 2 kV to 15 kV.

Factors that may affect water tree formation are cable construction, insulation and jacket material resistance to moisture absorption, degree of wetting, voltage level, and time energized. The potential for water treeing was considered applicable when medium voltage cables could be exposed to wetting in the form of cable submergence, and are under voltage stress (are energized) greater than 25% of the time. Water treeing appears most often in cross-linked polyethylene (XLPE) or high molecular weight polyethylene (HMWPE) insulation materials.

Based on industry operating experience, water treeing has been more prevalent in higher voltage cables. The formation and growth of water trees is much less severe in 5 kV cables than for those operated in the high-voltage range. Due to low dielectric stress, water trees do not occur in low-voltage cables. Effects are not measurable in relation to the determination of remaining cable life. However, observations can be made which show that precursors exist and actions may be taken to correct the environmental conditions that lead to water treeing, loss of dielectric strength, and eventual cable failure.

This aging mechanism was evaluated during the aging management reviews.

C3.6 BUILDUP OF DEPOSITS

Buildup of deposits due to biofouling is an aging effect requiring management for those heat exchangers cooled by a seawater or raw water environment.

Treated water systems utilize demineralized water or chemically-controlled water and are protected against the introduction of materials and organisms that result in biofouling. Operating experience indicates that heat exchanger tubes and tube sheets have not experienced a loss of heat transfer that would affect their intended function in treated water environments.

C3.6.1 BIOFOULING – METALS

For components cooled by seawater or raw water, fouling due to silting, corrosion product build-up, degraded coatings, and macro-organisms are concerns because of their potential to restrict heat transfer. Biofouling is considered a concern associated only with seawater or raw water systems, because treated water systems have not experienced biofouling. For systems exposed to seawater or raw water, buildup of deposits due to biofouling is an aging effect requiring management for heat exchanger tubes, tubesheets, and lined piping. For oil systems subject to water pooling, buildup of deposits due to biofouling is an aging effect requiring management for heat exchanger tubes and tubesheets.

This aging mechanism was evaluated during the aging management reviews.

C3.7 LOSS OF MATERIAL

Loss of material may be caused by general corrosion, pitting corrosion, galvanic corrosion, crevice corrosion, crevice corrosion/under-deposit attack, erosion corrosion/ flow-accelerated corrosion, microbiologically influenced corrosion, aggressive chemical attack, boric acid corrosion, fretting, selective leaching, erosion, abrasive erosion and cavitation, freeze-thaw, elevated temperatures, corrosion of embedded steel, abrasion, wood rot, and flaking.

C3.7.1 ABRASION – NON-METALLIC MATERIALS

Abrasion may occur when a vibrating item is in contact with the surface of fire wrap and fire stop. The interaction of the two components may abrade the fire wrap such that the required fireproof rating is not maintained in a localized area. Therefore, loss of material due to abrasion is an aging effect associated with fire wrap. Fire stops may also be susceptible to abrasion when in contact with vibrating equipment.

This aging mechanism was evaluated during the aging management reviews.

C3.7.2 ABRASIVE EROSION AND CAVITATION – CONCRETE

Water that carries abrasive material (solid particles in suspension) flowing on concrete surfaces, or that creates a negative pressure (vacuum), can cause abrasive erosion and cavitation of the concrete surface. When the solid particles are small and the flow velocity is in the range of 10-12 fps (or less), erosion of the concrete surface is negligible. Cavitation damage is also not likely if the flow velocity is less than 40 fps. Loss of material due to abrasive erosion and cavitation is applicable only to concrete structures and components that are exposed to continuously moving or fast-moving water.

This aging mechanism was evaluated during the aging management reviews.

C3.7.3 AGGRESSIVE CHEMICAL ATTACK – CONCRETE

Aggressive chemical attack involves the degradation of concrete by chemical agents that attack the concrete matrix, thus causing staining, material loss, cracking, and/or spalling. Acid attack may increase the porosity and permeability of concrete, may reduce strength, and may render the concrete susceptible to further deterioration. Below grade, sulfate solutions of sodium, potassium, and magnesium may attack concrete, often in combination with chlorides. Continued or frequent cyclic exposure to acidic solutions with a pH <5.5, solutions or environments with >500 ppm chlorides, or solutions with

>1500 ppm sulfates is necessary to cause significant degradation due to aggressive chemical attack.

This aging mechanism was evaluated during the aging management reviews.

C3.7.4 BORIC ACID CORROSION – METALS

Boric acid, in the presence of moisture, on the surface of carbon steel or copper can be corrosive. Significant loss of material can occur in the vicinity of an active leak. Inspections of surfaces affected by boric acid leakage, or in locations where boric acid residue exists, are performed to determine the effect on pressure boundary integrity.

This aging mechanism was evaluated during the aging management reviews.

C3.7.5 CORROSION OF EMBEDDED STEEL – CONCRETE

Corrosion of embedded steel can cause cracking, spalling, loss of bond, and loss of concrete material. Corrosion of embedded steel may be applicable to the surfaces of the steel that are in direct contact with concrete. Embedded steel is defined as those items that were installed while the concrete (or grout) was in a plastic state. Examples of embedded steel are reinforcing steel, plates, and anchor bolts.

The high alkalinity (i.e. pH >12.5) of the concrete provides an environment which helps protect the embedded steel from corrosion. However, when the pH is reduced by the intrusion of aggressive ions, corrosion can occur. Degradation due to corrosion of embedded steel is non-significant for concrete structures not exposed to an aggressive environment for extended periods. An aggressive environment is defined as pH <11.5 for the environment within concrete directly surrounding embedded steel, pH <5.5 for the environment adjacent to concrete, chlorides >500 ppm, or sulfates >1500ppm. If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete has a low water-to-cement ratio (0.35 to 0.45), adequate air entrainment (3% to 6%), and is designed in accordance with ACI 318-63 (Reference C-8) or ACI 349-85 (Reference C-12) (or later versions of this code). These provisions ensure adequate concrete cover, low permeability, and proper reinforcement distribution, which will minimize crack development and the potential for corrosion of embedded steel.

This aging mechanism was evaluated during the aging management reviews.

C3.7.6 CREVICE CORROSION – METALS

Crevice corrosion is a localized effect that occurs most frequently in joints and connections, or at points of contact between metals and non-metals, due to the formation of crevices. External surfaces of piping and components located within structures (sheltered environments) have not experienced corrosion degradation that would affect the intended function of components due to humidity in the absence of the cyclic or intermittent wetting conditions, such as condensation. When cyclic or intermittent wetting conditions are present, the potential for crevice corrosion exists.

Components fabricated from carbon steel, low-alloy steel, cast iron, and copper alloys are evaluated for susceptibility to crevice corrosion in conjunction with the evaluation for general corrosion.

This aging mechanism was evaluated during the aging management reviews.

C3.7.7 CREVICE CORROSION/UNDER-DEPOSIT ATTACK – METALS

Crevice corrosion is a localized effect that occurs most frequently in joints and connections, or at points of contact between metals and non-metals. Oxygen levels above 100 ppb and stagnant or low-flow conditions (<3 fps for raw water; <5 fps for seawater) are required for crevice corrosion initiation in carbon steel, low-alloy steel, austenitic stainless steel, cast-austenitic stainless steel, copper, and nickel-based alloys. Crevice corrosion due to under-deposit attack may result from aqueous macro-organisms, silting, or corrosion-product buildup.

Crevice corrosion/under-deposit attack may occur in all aqueous environments, but it is not expected to cause significant degradation in a properly controlled, high-purity water environment.

This aging mechanism was evaluated during the aging management reviews.

C3.7.8 ELEVATED TEMPERATURES – CONCRETE

Long-term exposure to elevated temperatures in excess of 300°F may cause surface scaling and cracking of concrete. Degradation from exposure to elevated temperature is insignificant for embedded reinforcing steel used in concrete structures that remain below 600°F.

This aging mechanism was evaluated during the aging management reviews.

C3.7.9 EROSION – METALS

Erosion is the removal of metal by the action of numerous individual impacts of solid or liquid particles that are entrained in the fluid stream. System flow rates and pipe routing are considered in the design to preclude the occurrence of erosion in fluid systems. Operating experience indicates that erosion in treated water systems may occur at large pressure reduction orifices, valves or pumps due to the increased local flow and turbulence. For this situation with treated water, the velocity limit varies by material. For the purposes of aging management review, a threshold flow velocity for fluid erosion of 12 fps for carbon steel, stainless steel, nickel-based alloys, and copper alloys; and 50 fps for titanium was established. These threshold values are far below industry recognized limits for fluid erosion flow velocities.

Additionally, material may also be eroded from a metal surface when hard particles slide or roll across the surface of another surface under pressure. Examples of this type of erosion, also termed wear, in typical nuclear power plant systems are crane rails or mechanical sliding feet supports for piping systems.

This aging mechanism was evaluated during the aging management reviews.

C3.7.10 EROSION-CORROSION/FLOW-ACCELERATED CORROSION – METALS

Erosion-corrosion/flow-accelerated corrosion (FAC) is the loss of material due to the combined actions of erosion caused by a flowing fluid and corrosion of the newly exposed base material that results from the erosion. This combined effect leads to an accelerated loss of material. Two factors that affect the likelihood of erosion-corrosion in carbon steel are flow rates and pH level. The erosion-corrosion phenomenon is applicable to carbon steel, low-alloy steel, and copper alloys.

The temperature threshold for the occurrence of erosion-corrosion in carbon steel and low-alloy steel is 100°F, a conservative value that considers both single-phase and two-phase flow. While single-phase flow with a temperature below 200°F is not an erosion-corrosion concern, there is no lower temperature limit assigned for two-phase flow. Therefore, it is conservatively considered that erosion-corrosion is possible above 100°F for both single-phase and two-phase flow.

Copper-nickel alloys are also susceptible to erosion-corrosion/flow-accelerated corrosion, but at lower temperatures than steels.

Erosion-corrosion/flow-accelerated corrosion was not considered for stainless steels and nickel-based alloys based on limited susceptibility to the aging mechanism.

This aging mechanism was evaluated during the aging management reviews.

C3.7.11 FLAKING – NON-METALLIC MATERIALS

Flaking may occur as fire wrap fibers are freed from the material surface and either become airborne or fall free from the fire wrap. This mechanism may be expected for sprayed-on fire proofing material. The fibers may be freed over time due to the force of gravity, air flow in the vicinity of the fireproofing, and vibrations induced in the fireproofed members. The rate of flaking is typically linear with respect to time. If flaking occurs for a sufficiently long time, it can potentially reduce the fireproofing thickness such that the required fireproof rating is not maintained. Fire stops are not found to be susceptible to flaking. Therefore, loss of material due to flaking is an applicable aging effect for some fire wraps, but not for fire stops.

This aging mechanism was evaluated during the aging management reviews.

C3.7.12 FREEZE-THAW – CONCRETE

Freeze-thaw degradation occurs as the result of repetitive freezing and thawing of free water that has permeated the concrete. The result can be cracking, spalling, crumbling, scaling, and exposure of aggregate and reinforcing bar. Resistance to freeze-thaw is dependent on the amount of entrained air and the permeability of the concrete. Freeze-thaw is not applicable to concrete structures if the concrete is of an appropriate mix and construction quality. Concrete structures designed and constructed in accordance with Codes ACI 318-63 (Reference C-8) and ACI 301-66 (Reference C-9) (or later versions of these codes) provide for low permeability and adequate air entrainment such that the concrete will not be susceptible to freeze-thaw effects.

This aging mechanism was evaluated during the aging management reviews.

C3.7.13 FRETTING – METALS

Fretting is localized wear that occurs between tight-fitting surfaces that are subject to cyclic motion of very small amplitude. Usually, fretting is accompanied by corrosion of the wear debris. With the exception of heat exchangers, the only locations susceptible to fretting are the reactor vessel and the reactor vessel internals in areas where relative motion is not completely restrained.

This aging mechanism was evaluated during the aging management reviews.

C3.7.14 GALVANIC CORROSION – METALS

Loss of material due to galvanic corrosion can occur when materials with different electrochemical potentials are in contact within an aqueous environment. Generally, the effects of galvanic corrosion are precluded by design attributes (e.g., isolation to prevent electrolytic connection or using similar materials).

Galvanic corrosion normally manifests itself in the form of localized loss of material at the surface of the more active (anodic) metal. The type of damage caused is similar to that caused by pitting corrosion. Typically, it is not until a more in-depth evaluation of materials is performed that a definitive cause determination can be made.

Components fabricated from carbon steel, low-alloy steel, cast iron, and copper alloys are evaluated for susceptibility to galvanic corrosion in conjunction with the general corrosion evaluation in the AMR.

C3.7.15 GENERAL CORROSION – METALS

General corrosion is surface deterioration that is characterized by uniform thinning without appreciable localized attack. It is the result of chemical or electrochemical reaction between a material and an aggressive environment. Both oxygen and moisture are necessary for corrosion of iron contained in carbon steel and low-alloy steel.

Corrosion is precluded by the absence of either moisture or oxygen, or by placing a protective coating or liner on the component. Corrosion of carbon steel and low-alloy steel is possible regardless of whether or not the water is treated.

External surfaces of carbon steel and low-alloy steel piping and 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.

Loss of material due to general corrosion, galvanic corrosion, crevice corrosion, and pitting corrosion requires an aerated aqueous, damp soil, intermittently wetted, or atmosphere/weather environment. Components fabricated from carbon steel, low-alloy steel, and copper alloys are evaluated for susceptibility to general corrosion.

Wrought austenitic stainless steels, cast austenitic stainless steel (CASS), aluminum, and nickel-based alloys are not susceptible to significant general corrosion that would affect the intended function of components.

This aging mechanism was evaluated during the aging management reviews.

C3.7.16 MICROBIOLOGICALLY INFLUENCED CORROSION – METALS

Microbiologically influenced corrosion (MIC) is a form of localized corrosive attack accelerated by the influence of microbiological activity due to the presence of certain organisms. Microbiological organisms can produce corrosive substances, as a byproduct of their biological processes, that disrupt the protective oxide layer on the component materials and lead to a material depression similar to pitting corrosion. Microscopic organisms have been observed in mediums over a wide range of temperatures and pH values. However, for the purpose of aging management review, loss of material due to MIC is not considered significant at temperatures greater than 210°F or pH greater than 10.

This aging mechanism was evaluated during the aging management reviews.

C3.7.17 PITTING CORROSION – METALS

Pitting corrosion is a form of localized attack that results in depressions in the metal of treated water systems. Oxygen is required for the initiation of pitting corrosion. Contaminants such as halogens or sulfates, are required for continued metal dissolution. Pitting corrosion occurs when passive films in local areas attack passive materials. Once a pit penetrates the passive films in local areas are breached. Once the passive film is breached, galvanic conditions occur because the metal in this location is anodic relative to the passive film. Maintaining adequate flow rate over this exposed surface of a component can inhibit pitting corrosion. However, stagnant or low flow conditions are assumed to exist in all systems where dead legs of piping, such as vents or drains, exist. Pitting corrosion is more common in passive materials such as austenitic stainless steels, than with non-passive materials. For treated water environments, stainless steel and carbon steel are assumed to be susceptible to pitting in the presence of chlorides in excess of 150 ppb or sulfates in excess of 100 ppb, when dissolved oxygen is in excess of 100 ppb.

External surfaces of piping and 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.

Components fabricated from carbon steel, low-alloy steel, cast iron, and copper alloys are evaluated for susceptibility to pitting corrosion in conjunction with the general corrosion AMR evaluation.

This aging mechanism was evaluated during the aging management reviews.

C3.7.18 WOOD ROT – NON-METALLIC

Loss of material due to rot can occur in wood and wood products.

This aging mechanism was evaluated during the aging management reviews.

C3.7.19 SELECTIVE LEACHING – METALS

Selective leaching of copper alloys (de-alloying) is the selective corrosion of one or more components of a copper alloy. The material so affected loses density and strength. This mechanism occurs for copper alloys in seawater, raw water, and damp soil environments.

Selective leaching of gray cast iron (graphitization) is corrosion, which occurs as the iron matrix is selectively leached away and a porous matrix of graphite remains. This mechanism occurs in relatively mild aqueous solutions and on buried piping and fittings.

This aging mechanism was evaluated during the aging management reviews.

C3.8 LOSS OF PRE-LOAD

Plant Technical Specifications maintain strict leakage controls on the reactor coolant pressure boundary so that leakage can be quickly identified and accounted for during plant operations. As such, fasteners used in systems to maintain the reactor coolant pressure boundary (i.e., ASME Class 1) warrant additional assurances inherent in nuclear safety beyond those required for ASME Class 2, 3, and Non Class system fasteners. Therefore, the loss of pre-load due to stress relaxation is an aging effect associated with ASME Class 1 system bolted connections.

Threaded fasteners associated with the reactor vessel internals may also experience loss of pre-load due to stress relaxation. These components are not pressure-retaining bolting, but are required to ensure that reactor vessel internals maintain core orientation.

C3.8.1 STRESS RELAXATION – METALS

Stress relaxation is related to the creep phenomenon and causes loss of operating pre-loads in stressed components operating at relatively high temperatures. Stress relaxation is of primary concern in such components as high-strength bolting, which experiences a large pre-load. High operating temperatures increase the probability for stress relaxation. Most stress relaxation occurs early in the component's life. Operating experience does not indicate that stress relaxation is a significant aging effect requiring management for non-ASME Class 1 components. However, stress relaxation of ASME Class 1 components is evaluated.

Threaded fasteners associated with the reactor vessel internals may also experience loss of pre-load due to stress relaxation. These components are not pressure-retaining bolting, but are required to ensure that reactor vessel internals maintain core orientation.

This aging mechanism was evaluated during the aging management reviews.

C3.9 REDUCED STRENGTH

Reduced strength of fiberglass is due to ozone exposure or ultraviolet exposure.

C3.9.1 OZONE EXPOSURE – NON-METALLIC MATERIALS

Exposure to 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 high levels of ozone that might be found in conjunction with high-voltage electrical equipment would be most prone to this effect. Exposure to normal environmental ozone is not a concern.

This aging mechanism was evaluated during the aging management reviews.

C3.9.2 ULTRAVIOLET EXPOSURE – NON-METALLIC MATERIALS

Exposure to ultraviolet radiation 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 would be most prone to damage. Exposure to indoor ambient lighting is not a concern.

This aging mechanism was evaluated during the aging management reviews.

C3.10 LOSS OF FRACTURE TOUGHNESS

Loss of fracture toughness is due to thermal embrittlement, neutron embrittlement, or hydrogen embrittlement.

C3.10.1 HYDROGEN EMBRITTLEMENT – METALS

Hydrogen embrittlement is a potential problem only in high-strength steel in environments charged with atomic hydrogen. This mechanism is not likely to occur if the yield strength of the material is less than 120 ksi or there is no source of atomic hydrogen.

This aging mechanism was evaluated during the aging management reviews.

C3.10.2 NEUTRON EMBRITTLEMENT – METALS, NON-METALLIC MATERIALS

Neutron embrittlement is the loss of fracture toughness resulting from the bombardment of neutrons at fluence levels greater than 1×10^{17} n/cm^2. The loss of fracture toughness may be accompanied by detectable increases in material hardness. The overall effects of neutron embrittlement on steel are increased yield strength, decreased ultimate tensile ductility, and increased ductile-to-brittle transition temperature. There is insufficient neutron flux outside of the reactor pressure vessel to result in neutron embrittlement. Therefore, components outside the reactor pressure vessel are not evaluated for neutron embrittlement.

This aging mechanism was evaluated during the aging management reviews.

C3.10.3 THERMAL EMBRITTLEMENT – METALS

Thermal embrittlement is a mechanism by which the mechanical property fracture toughness is affected as a result of exposure to elevated temperature. Cast austenitic stainless steel (CASS) materials are susceptible to thermal embrittlement, dependent upon material composition and the time at elevated temperature. CASS materials subjected to temperatures >482°F are considered susceptible. Low-alloy steels may be subject to embrittlement from exposure to temperatures in the range of 570°F - 1100°F. The loss of fracture toughness may not be accompanied by significant changes in other material properties.

This aging mechanism was evaluated during the aging management reviews.

C4.0 REVIEW OF NUREG-0933

NUREG-0933 (Reference C-5) has been reviewed in accordance with the guidance provided in Appendix A.3 of the Standard Review Plan (Reference C-6). As a result of this review, the following generic safety issues (GSI) were evaluated for license renewal and are addressed in the LRA:

1. GSI-168, *Environmental Qualification of Electrical Equipment,* is addressed in Section 4.4, Environmental Qualification of Electric Equipment.
2. GSI-190, *Fatigue Evaluation of Metal Components for 60-Year Plant Life,* is addressed Section 4.3.3, Environmentally Assisted Fatigue.

APPENDIX C REFERENCES

C-1 NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule*, Rev. 3, Nuclear Energy Institute, March 2001.

C-2 Letter to Nuclear Energy Institute, *License Renewal Issue No. 98-12, Consumables*, U.S. Nuclear Regulatory Commission, March 10, 2000.

C-3 Information Bulletin 82-02, *Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants*, U.S. Nuclear Regulatory Commission, June 2, 1982.

C-4 Generic Letter 91-17, *Generic Safety Issue 29, "Bolting Degradation or Failure in Nuclear Power Plants"*, U.S. Nuclear Regulatory Commission, October 17, 1991.

C-5 NUREG-0933, *A Prioritization of Generic Safety Issues*, U.S. Nuclear Regulatory Commission, June 2001.

C-6 *NUREG-1800, Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, U.S. Nuclear Regulatory Commission.

C-7 NUREG-1801,*Generic Aging Lessons Learned (GALL) Report*, U.S. Nuclear Regulatory Commission.

C-8 ACI 318-63, *Building Code Requirements for Reinforced Concrete*, American Concrete Institute.

C-9 ACI 301-66, *Specification for Structural Concrete for Buildings*, American Concrete Institute, 1966.

C-10 ACI 201-2R-77, *Guide to Durable Concrete, Part I*, American Concrete Institute, Detroit, MI.

C-11 SAND96-0344, UC-523, *Aging Management Guideline for Commercial Nuclear Plants Electrical Cable and Terminations*, September 1996.

C-12 ACI 349-85 *Code Requirements for Nuclear Safety Related Concrete Structures*, ASTM C295, *Standard Guide for Petrographic Examination of Aggregates for Concrete*, ASTM INTERNATIONAL, West Conshohocken, PA

C-13 ASTM C227, *Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)*, ASTM INTERNATIONAL, West Conshohocken, PA

APPENDIX D TECHNICAL SPECIFICATION CHANGES

10 CFR 54.22, requires that an application for license renewal include any Technical Specification changes, or additions that are necessary to manage the effects of aging during the period of extended operation. A review of the information provided in this License Renewal Application and the unit's Technical Specifications confirms that no changes to the Technical Specifications are necessary.