Progress Energy

Harris Nuclear Plant

License Renewal Application

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PREFACE

The following describes the content of the HNP License Renewal Application.

Chapter 1 provides the administrative information required by 10 CFR 54.17 and 10 CFR 54.19.

Chapter 2 describes and justifies the methodology used to determine the systems, structures, and components within the scope of license renewal and the structures and components subject to an aging management review. The results of applying the scoping methodology are provided in Tables 2.2-1, 2.2-2, and 2.2-3. These tables provide listings of the mechanical systems, structures, and electrical/instrumentation and control systems within the scope of license renewal. Chapter 2 also provides a description of the systems and structures and their intended functions and provides tables identifying the system and structure components/commodities requiring aging management review and their intended functions. The descriptions also identify the applicable license renewal boundary drawings for mechanical systems. The drawings are included in a separate submittal. A discussion of the NRC Interim Staff Guidance topics for license renewal is included as a subsection of Chapter 2.

Chapter 3 describes the results of the aging management reviews of structures and components requiring an aging management review. Chapter 3 is divided into six sections that address the areas of: (1) Reactor Vessel, Internals, and Reactor Coolant System, (2) Engineered Safety Features, (3) Auxiliary Systems, (4) Steam and Power Conversion Systems, (5) Containments, Structures, and Component Supports, and (6) Electrical and Instrumentation and Controls. The tables in Chapter 3 provide a summary of information concerning aging effects requiring management and applicable aging management programs for structures and components. The information presented in the tables is based on industry guidance for format and content of applications that rely on NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, (the SRP-LR). The tables provide a discussion of the applicability of the component commodity groups to HNP and information regarding the degree to which proposed aging management programs are consistent with those recommended in NUREG-1801, "Generic Aging Lessons Learned (GALL)," Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, (the GALL Report).

Chapter 4 addresses Time-Limited Aging Analyses, as defined by 10 CFR 54.3, and includes the identification of the component or subject, and an explanation of the time-dependent aspects of the calculation or analysis. Chapter 4 demonstrates whether (1) the analyses remain valid for the period of extended operation, or (2) the analyses have been projected to the end of the period of extended operation, or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. Chapter 4 also provides the results of a review of exemptions issued pursuant to 10 CFR 50.12 to determine if any involve a Time-Limited Aging Analysis.

Appendix A, the Final Safety Analysis Report Supplement, provides a summary description of the programs and activities for managing the effects of aging during 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.

Appendix B, Aging Management Programs, describes the programs and activities that are credited to assure the effects of aging of components and structures will be managed such that they will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. Appendix B also addresses programs that are credited in the evaluation of Time-Limited Aging Analyses.

Appendix C is not used.

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.

A supplement to the Environmental Report is provided in Appendix E, entitled, "Applicant’s Environmental Report – Operating License Renewal Stage."

ACRONYMS AND ABBREVIATIONS	
AC	Alternating Current
ACI	American Concrete Institute
ACP	Auxiliary Control Panel
ACRS	Advisory Committee on Reactor Safeguards
ACSR	Aluminum Conductor Steel Reinforced
AERM	Aging Effects Requiring Management
AFW	Auxiliary Feedwater
AISC	American Institute of Steel Construction
AMP	Aging Management Program
AMR	Aging Management Review
AMSAC	ATWS Mitigating System Actuation Circuitry
ANSI	American National Standards Institute
AOO	Anticipated Operational Occurrence
API	American Petroleum Institute
ART	Adjusted Reference Temperature
ASCE	American Society of Civil Engineers
ASDV	Atmospheric Steam Dump Valve
ASME	American Society of Mechanical Engineers
AST	Alternative Source Term
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
AWS	American Welding Society
B&PV	Boiler and Pressure Vessel
BIT	Boron Injection Tank
BMV	Bare Metal Visual
BTP	Branch Technical Position
BTRS	Boron Thermal Regeneration System
BWR	Boiling Water Reactor
CAP	Corrective Action Program
CASS	Cast Austenitic Stainless Steel
CCW	Component Cooling Water
CIS	Containment Isolation System
CLB	Current Licensing Basis
CMAA	Crane Manufacturers Association of America
CP&L	Carolina Power & Light Company, a Progress Energy Company
CRACS	Control Room Air Conditioning System
CRDM	Control Rod Drive Mechanism
CREFS	Control Room Emergency Filtration System
CRIS	Control Room Isolation Signal
CS	Carbon Steel
CSAS	Containment Spray Actuation Signal
CSI	Charging and Safety Injection
CSIP	Charging and Safety Injection Pump
CSS	Containment Spray System
CST	Condensate Storage Tank
CT	Cooling Tower

ACRONYMS AND ABBREVIATIONS

CTMU	Cooling Tower Makeup
CUF	Cumulative Usage Factor
CVCS	Chemical and Volume Control System
CVIS	Containment Ventilation Isolation Signal
C_VUSE	Upper Shelf Energy determined by Charpy V-Notch Test Results
CWS	Circulating Water System
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DC	Direct Current
DEH	Digital-Electric Hydraulic
DG	Diesel Generator
DGFOSTS	Diesel Generator Fuel Oil Storage and Transfer System
DGLS	Diesel Generator Lubrication System
DWST	Demineralized Water Storage Tank
EAF	Environmentally Assisted Fatigue
ECCS	Emergency Core Cooling System
EDB	(PassPort) Equipment Database
EDG	Emergency Diesel Generator
EFPY	Effective Full Power Years
EHC	Electro-Hydraulic Control
EMA	Equivalent Margin Analysis
EOL	End of Life
EPDM	Ethylene Propylene Diene Monomer
EPR	Ethylene Propylene Rubber
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
EQML	Environmental Qualification Master List
ER	Environmental Report
ERFIS	Emergency Response Facility Information System
ESCWS	Essential Services Chilled Water System
ESF	Engineered Safety Features
ESFAS	Engineered Safety Features Actuation Signal
ESW	Emergency Service Water
ESW & CT	Emergency Service Water and Cooling Tower
ESWSW	Emergency Screen Wash System
ETFE	Ethylene Tetrafluoroethylene
FAC	Flow Accelerated Corrosion
Fen	Environmental Fatigue Factor
FEP	Fluorinated Ethylene Propylene
FERC	Federal Energy Regulatory Commission
FHA	Fire Hazards Analysis
FHB	Fuel Handling Building
FMH	Flexible Metal Hose
FO	Fuel Oil
FOL	Facility Operating License
FOST	Fuel Oil Storage Tank
FP	Fire Protection

ACRONYMS AND ABBREVIATIONS

FSAR	Final Safety Analysis Report
ft.	foot, feet
FW	Feedwater
GALL	Generic Aging Lessons Learned (the GALL Report is NUREG-1801)
GDC	General Design Criteria
GL	Generic Letter
GSI	Generic Safety Issue
HELB	High Energy Line Break
HEPA	High Efficiency Particulate Air
HHSI	High Head Safety Injection
HMWPE	High Molecular Weight Polyethylene
HNP	Harris Nuclear Plant.
HVAC	Heating, Ventilating, and Air Conditioning
I&C	Instrumentation and Control
IA	Instrument Air
IASCC	Irradiation Assisted Stress Corrosion Cracking
ICC	Inadequate Core Cooling
IE	Inspection and Enforcement (former NRC Office of Inspection and Enforcement)
IEEE	Institute Of Electrical And Electronic Engineers
IGSCC	Intergranular Stress Corrosion Cracking
ILRT	Integrated Leak Rate Test (Containment Type A Test)
IN	Information Notice
in.	inch, inches
INPO	Institute for Nuclear Power Operations
IPA	Integrated Plant Assessment (10 CFR 54.21(a))
IPCEA	Insulated Power Cable Engineers Association
IR	Insulation Resistance
ISG	Interim (NRC) Staff Guidance
ISI	In-Service Inspection
KV	Kilovolt
LBB	Leak-Before-Break
LER	Licensee Event Report
LHSI	Low Head Safety Injection
LLRT	Local Leak Rate Test
LO	Lubricating Oil
LOCA	Loss of Coolant Accident
LR	License Renewal
LRA	License Renewal Application
MCB	Main Control Board
MCC	Motor Control Center
MEB	Metal Enclosed Bus
MeV	Million Electron Volts
MFIS	Main Feedwater Isolation Signal
MFIV	Main Feedwater Isolation Valve
MFTDS	Modular Fluidized Transfer Demineralization System
MIC	Microbiologically Influenced Corrosion
MS	Main Steam

ACRONYMS AND ABBREVIATIONS

MSIV	Main Steam Isolation Valve
MSL	Main Steam Line, Mean Sea Level
MSLB	Main Steam Line Break
MSR	Moisture Separator Reheater
NDE	Nondestructive Examination
NDTT	Nil-Ductility Transition Temperature
NEI	Nuclear Energy Institute
NESC	National Electrical Safety Code
NESCWS	Non-Essential Services Chilled Water System
NFPA	National Fire Protection Association
Ni	Nickel
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
NSR	Non-Safety Related
NSSS	Nuclear Steam Supply System
NSW	Normal Service Water
NUREG	Designation of publications prepared by the NRC staff
ODSCC	Outside Diameter Stress Corrosion Cracking
OE	Operating Experience
OPB	Outside the Power Block
PASS	Post-Accident sampling System
PCB	Power Circuit Breaker
PE	Polyethylene
PEC	Progress Energy Carolinas
PFM	Probabilistic Fracture Mechanics
pH	Concentration of Hydrogen Ions
PILC	Paper Insulated Lead Covered
PM	Preventive Maintenance
PORV	Power-Operated Relief Valve
PRT	Pressurizer Relief Tank
PSI	Passive Safety Injection
psid	pounds per square inch differential
PSS	Primary Sampling System
P-T	Pressure-Temperature
PTS	Pressurized Thermal Shock
PVC	Polyvinyl Chloride
PWR	Pressurized Water Reactor
QA	Quality Assurance
RAB	Reactor Auxiliary Building
RABNVS	Reactor Auxiliary Building Normal Ventilation System
RABSRVS	Reactor Auxiliary Building Switchgear Rooms Ventilation System
RAI	Request for Additional Information
RCCA	Rod Cluster Control Assembly
RCDT	Reactor Coolant Drain Tank
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System

ACRONYMS AND ABBREVIATIONS

RFO	Refueling Outage
RG	Regulatory Guide
RHR	Residual Heat Removal
RI	Risk Informed
RMWST	Reactor Makeup Water Storage Tank
RPV	Reactor Pressure Vessel
RT_{NDT}	Reference Temperature, Nil-Ductility Transition
$RT_{NDT(U)}$	Reference Temperature, Nil-Ductility Transition (Unirradiated)
RV	Reactor Vessel
RVI	Reactor Vessel Internals
RVLIS	Reactor Vessel Level Indicating System
RWST	Refueling Water Storage Tank
SBO	Station Blackout
SC	Structure/Component (10 CFR 54.21(a)(1))
SCC	Stress Corrosion Cracking
SE	Safety Evaluation
SER	Safety Evaluation Report
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SHNPP	Shearon Harris Nuclear Power Plant
SI	Safety Injection
SIS	Safety Injection Signal
SIT	Structural Integrity Test
SR	Silicone Rubber
SRP	Standard Review Plan
SRP-LR	Standard Review Plan for License Renewal (the SRP-LR is NUREG-1800)
SRV	Safety Relief Valve
SS	Stainless Steel
SSC	Systems, Structures, and Components (10CFR 54.4(a))
SSE	Safe Shutdown Earthquake
SUT	Startup Transformer
SWS	Service Water System
TAC	Technical Assignment Control (internal NRC work management tool)
TGSCC	Trans-Granular Stress Corrosion Cracking
TID	Total Integrated Dose
TLAA	Time-Limited Aging Analysis
TSC	Technical Support Center
UAT	Unit Auxiliary Transformer
UHS	Ultimate Heat Sink
UPS	Uninterruptible Power Supply
USAS	United States of America Standards
UT	Ultrasonic Test
UV	Ultraviolet
VAC	Volts alternating current
VCT	Volume Control Tank
VDC	Volts direct current
VHP	Vessel Head Penetration

ACRONYMS AND ABBREVIATIONS

WANO	World Association of Nuclear Operators
WCAP	Westinghouse Commercial Atomic Power
wg	water gauge
WOG	Westinghouse Owners Group
WPB	Waste Processing Building
WPS	Waste Processing System
XLP, XLPE	Cross-linked Polyethylene
XLPO	Cross-linked Polyolefin

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1.0 ADMINISTRATIVE INFORMATION

1.1 PURPOSE AND GENERAL INFORMATION

In accordance with the requirements of Part 54 of Title 10 of the Code of Federal Regulations (10 CFR 54), Carolina Power & Light Company, doing business as Progress Energy Carolinas, Inc., a subsidiary of Progress Energy, Inc., has prepared this application to provide the technical and environmental information required for renewal of Facility Operating License (FOL) No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit No. 1, also known as the Harris Nuclear Plant (HNP). This application supports License Renewal for an additional 20-year period beyond the end of the current license term of FOL NPF-63. The end of the current license term is October 24, 2026. The technical information consists of (1) an Integrated Plant Assessment, as defined in 10 CFR 54.21(a), (2) an evaluation of time-limited aging analyses, as defined in 10 CFR 54.21(c), (3) a supplement to the HNP Final Safety Analysis Report (FSAR), as required by 10 CFR 54.21(d), and (4) environmental information, as required by 10 CFR 54.23. The environmental information is provided as a separate appendix to the application, Appendix E, entitled "Applicant's Environmental Report – Operating License Renewal Stage."

This application and supporting environmental report are intended to provide sufficient information for the NRC to complete its technical and environmental reviews and allow the NRC to make the finding required by 10 CFR 54.29 in support of the issuance of a renewed operating license for HNP. The following is the application filing and content information required by 10 CFR 54.17 and 10 CFR 54.19.

1.1.1 NAME OF APPLICANT

Carolina Power & Light Company, doing business as,
Progress Energy Carolinas, Inc.

1.1.2 ADDRESS OF APPLICANT

Carolina Power & Light Company,
d/b/a Progress Energy Carolinas, Inc.
410 S. Wilmington Street
Raleigh, NC 27601-1748

Address of Harris Nuclear Plant:

Progress Energy Carolinas, Inc.
Harris Nuclear Plant
5413 Shearon Harris Rd.
New Hill, NC 27562

1.1.3 OCCUPATION OF APPLICANT

Carolina Power & Light Company, doing business as Progress Energy Carolinas, Inc. (hereinafter referred to as the Company), is a corporation primarily engaged in the generation, transmission, distribution, and sale of electricity in portions of North and South Carolina. The Company serves approximately 1.4 million customers in a territory encompassing over 34,000 square miles including the cities of Raleigh, Wilmington, Fayetteville, and Asheville in North Carolina, and Florence and Sumter in South Carolina.

1.1.4 ORGANIZATION AND MANAGEMENT OF APPLICANT

The Company is a corporation organized and existing under the laws of the State of North Carolina. The Company is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. The Company makes this application on its own behalf and is not acting as an agent or representative of any other person.

The names and addresses of Progress Energy directors and principal officers are listed below. All persons listed are U. S. citizens.

Director	Address
Edwin B. Borden	Goldsboro, NC
James E. Bostic Jr.	Atlanta, GA
David L. Burner	Darby, MT
Richard L. Daugherty	Raleigh, NC
Harris. E DeLoach, Jr.	Hartsville, SC
W. D. (Bill) Frederick, Jr.	Orlando, FL
W. Steven Jones	Chapel Hill, NC
Robert B. McGehee	Raleigh, NC
E. Marie McKee	Corning, NY
John H. Mullin, III	Brookneal, VA
Carlos A. Saladrigas	Miami, FL
Theresa M. Stone	Greensboro, NC
Alfred C. Tollison, Jr.	Marietta, GA
Jean Giles Wittner	St. Petersburg, FL

Principal Officers	Address
Robert B. (Bob) McGehee Chairman and Chief Executive Officer Progress Energy	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
William D. (Bill) Johnson President and Chief Operating Officer - Progress Energy	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
Peter M. Scott III Executive Vice President & Chief Financial Officer Progress Energy President and Chief Executive Officer - Progress Energy Service Company	Progress Energy Service Company, LLC 410 S. Wilmington Street Raleigh, NC 27601-1748
Jeffry (Jeff) A. Corbett Senior Vice President - Energy Delivery Progress Energy Florida	Progress Energy, Inc. 100 Central Avenue St. Petersburg, Fl 33701-3324
Fred N. Day IV President and Chief Executive Officer Progress Energy Carolinas	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
C. S. (Scotty) Hinnant Senior Vice President and Chief Nuclear Officer – Nuclear Generation Progress Energy Carolinas and Progress Energy Florida	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
Jeffrey (Jeff) J. Lyash President and Chief Executive Officer Progress Energy Florida	Progress Energy, Inc. 100 Central Avenue St. Petersburg, Fl 33701-3324
John R. McArthur General Counsel & Corporate Secretary Progress Energy Senior Vice President - Corporate Relations Progress Energy Service Company	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
Mark F. Mulhern President Progress Energy Ventures	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748

Principal Officers	Address
Paula Sims Senior Vice President - Regulated Services Progress Energy Carolinas and Progress Energy Florida	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
E. Michael (Mike) Williams Senior Vice President - Power Operations Progress Energy Carolinas and Progress Energy Florida	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748
Lloyd M. Yates Senior Vice President - Energy Delivery Progress Energy Carolinas	Progress Energy, Inc. 410 S. Wilmington Street Raleigh, NC 27601-1748

1.1.5 CLASS AND PERIOD OF LICENSE SOUGHT

The Company requests renewal of the Class 103 Facility Operating License No. NPF-63 for HNP for a period of 20 years beyond the expiration of the current license. Approval of this License Renewal request would extend the operating license for HNP from midnight (i.e., 2400 hours) October 24, 2026, until midnight October 24, 2046. The facility would continue to be known as the Shearon Harris Nuclear Power Plant, Unit No. 1, and would continue to generate electric power during the period of extended operation. The Company also requests renewal of the source, byproduct, and special nuclear material licenses that are combined in the current operating license.

1.1.6 ALTERATION SCHEDULE

The Company does not propose to construct or alter any production or utilization facility in connection with this renewal application.

1.1.7 REGULATORY AGENCIES AND LOCAL PUBLICATIONS

The Federal Energy Regulatory Commission and the North Carolina Utilities Commission are the principal regulators of the Company's electric operations in North Carolina.

Magalie Roman Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, NC 27699-4325

Area and local news publications and addresses are provided below.

The News & Observer
215 S. McDowell Street
Raleigh, NC 27602

The Sanford Herald
208 St. Clair Ct.
Sanford, NC 27331

The Southern Pines Pilot
P.O. Box 58
Southern Pines, NC 28388

1.1.8 CHANGES TO THE 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 HNP states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement. Item 3 of the Attachment to the indemnity agreement, as amended, lists operating license NPF-63. The Company requests that conforming changes be made to the indemnity agreement, and/or the Attachment to the agreement, as required, to specify the extension of the agreement until the expiration date of the renewed HNP operating license as sought in this application.

1.1.9 RESTRICTED DATA AGREEMENT

This application does not contain any Restricted Data or other defense information, and the Company does not expect that any activity under the renewed license will involve such information. However, if such information were to become involved, the Company agrees that it will appropriately safeguard such information and not permit any individual to have access to, or any facility to possess, such information until the individual or facility has been approved for such access under the provisions of 10 CFR Part 25 and/or 10 CFR Part 95.

1.2 DESCRIPTION OF THE HARRIS NUCLEAR PLANT (HNP)

The HNP site is located in the extreme southwest corner of Wake County, North Carolina, and the southeast corner of Chatham County. North Carolina. The city of Raleigh, NC is approximately 16 miles northeast; and the city of Sanford, NC is about 15 miles southwest.

The Nuclear Steam Supply System (NSSS) for the Unit is a pressurized water reactor (PWR) consisting of three closed reactor coolant loops connected in parallel to the reactor vessel, each containing a reactor coolant pump and a steam generator. An electrically heated pressurizer is connected to the hot leg of one of the loops. The NSSS, along with the design and fabrication of the initial fuel core, was supplied by Westinghouse Electric Corporation.

Major plant structures include the Containment Building; Reactor Auxiliary Building, which contains the Control Room; Turbine Building; Waste Processing Building; Diesel Generator Building; Service Building; Fuel Handling Building; Tank Building; and Cooling Tower.

The Containment is a steel lined reinforced concrete structure in the form of a vertical right-cylinder with a hemispherical dome and a flat base with a recess beneath the reactor vessel.

Additional descriptive information about HNP systems, structures, and components is provided in later chapters of this application.

1.3 TECHNICAL INFORMATION REQUIRED FOR AN APPLICATION

In accordance with 10 CFR 54.21, four technical items are required to support an application for a renewed operating license. These are (1) an Integrated Plant Assessment (IPA), (2) an evaluation of time-limited aging analyses (TLAAs), (3) a supplement to the HNP FSAR that contains a summary description of the programs and activities for managing the effects of aging and the evaluation of the TLAAs, and (4) any changes to the current licensing basis (CLB) that occur during NRC review. In this application, the IPA information is provided in Chapter 2, Chapter 3 and Appendix B; the TLAA information, in Chapter 4; the FSAR information, in Appendix A; and the methodology for addressing future CLB changes is provided in Section 1.4.

In addition to the technical information, 10 CFR 54.22 requires applicants to submit any Technical Specification changes or additions necessary to manage the effects of aging during the period of extended operation. As noted in Appendix D, no changes to the HNP Technical Specifications are required to support this application.

10 CFR 54.23 requires the application to include a supplement to the Environmental Report. A report entitled "Applicant’s Environmental Report – Operating License Renewal Stage" has been provided as Appendix E of the application.

The IPA, as defined by 10 CFR 54.3, is a licensee assessment that demonstrates that a nuclear power plant’s structures and components requiring aging management review in accordance with 10 CFR 54.21(a) for License Renewal have been identified. The IPA also demonstrates that the effects of aging on the functionality of such structures and components will be managed to maintain the current licensing basis during the period of extended operation. The HNP IPA includes:

1. Identification of the structures and components within the scope of License Renewal that are subject to an aging management review;

2. Identification of the aging effects applicable to these structures and components;

3. Identification of plant-specific programs and activities that will manage these identified aging effects; and

4. A demonstration that these programs and activities will be effective in managing the effects of aging during the period of extended operation.

The IPA for License Renewal, along with other information necessary to document compliance with 10 CFR 54, is maintained in an auditable and retrievable form, in accordance with 10 CFR 54.37(a). The IPA is documented with site-specific documents and calculations that were generated in accordance with the HNP Quality Assurance Program.

1.4 CURRENT LICENSING BASIS CHANGES DURING NRC REVIEW

Each year, following the submittal of the HNP License Renewal Application and at least three months before the scheduled completion of the NRC review, the Company will submit amendments to the application pursuant to 10 CFR 54.21(b). The amendments will identify any changes to the current licensing basis that materially affect the contents of the License Renewal Application, including the FSAR supplement and any other aspects of the Application.

1.5 ADDITIONAL RECORDS AND RECORD KEEPING REQUIREMENTS

In accordance with 10 CFR 54.37(b), the Company will incorporate into updates to the HNP FSAR, as required by 10 CFR 50.71(e), any newly identified SSCs that would have been subject to an aging management review or evaluation of time-limited aging analyses in accordance with 10 CFR 54.21 and describe how the effects of aging will be managed such that the intended functions of the SSCs are maintained during the period of extended operation.

As stated in the discussion of 54.37(b) in the Statements of Consideration for the revised License Renewal regulations (60 FR 22461, May 8, 1995), "[t]he Commission believes that it is important to note that the systems, structures, and components discussed in 54.37(b) are those *newly identified* systems, structures, and components that would have been subject to an aging management review in the License Renewal process. If identified as part of the License Renewal process, information concerning the aging management for these systems, structures, and components would have been contained in the application for License Renewal."

Upon issuance of a renewed license, guidance will be incorporated into administrative control procedures to identify existing SSCs not within the scope of License Renewal that, because of plant modifications or analysis revisions, are consequently determined to meet the scoping criteria of 10 CFR 54.4. These plant modifications or analysis revisions will also be reviewed to determine if any existing analysis would have been a TLAA. The information required by 10 CFR 54.37(b) for these newly identified SSCs will be incorporated into the FSAR.

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

This chapter describes the process and results of identifying structures and components subject to an aging management review. 10 CFR 54.4 provides requirements for determining whether plant structures, systems, and components (SSCs) are in scope for license renewal. For those SSCs, 10 CFR 54.21(a)(1) requires a license renewal application to include an Integrated Plant Assessment (IPA) that identifies and lists the structures and components (SCs) subject to an aging management review. 10 CFR 54.21(a)(2) further requires that the methods used to identify and list these structures and components be described and justified. The technical information in this chapter is intended to satisfy these requirements.

The HNP license renewal review methodology is consistent with the approach recommended in NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 6, Nuclear Energy Institute, June 2005 (hereinafter referred to as NEI 95-10). The methodology consists of three processes: scoping, screening, and aging management reviews. These processes have been implemented in accordance with the HNP Quality Assurance Program.

Scoping and screening methodologies are described in Section 2.1. The results of applying the methodology to identify the systems and structures within the scope of license renewal (scoping) are contained in Section 2.2. The results of applying the methodology for identification of components and structure components subject to an aging management review (screening) are contained in Section 2.3 for mechanical systems, Section 2.4 for structures, and Section 2.5 for electrical and instrumentation and control (I&C) systems.

The information provided in this Chapter provides the basis for the NRC to make the finding required by 10 CFR 54.29(a)(1) regarding identification of the SCs that require aging management review.

The following table defines the meanings of abbreviations for intended functions used on the system and structure screening results tables provided in Sections 2.3, 2.4, and 2.5, and on the aging management review results tables provided in Chapter 3.0.

Table 2.0-1 Intended Function Abbreviations and Definitions

Abbrev.	Intended Function	Definition
Civil/Structural Intended Functions		
C-1	Structural Pressure Boundary	Provide pressure boundary or essentially leaktight barrier to protect public health and safety in the event of any postulated design-basis events.
C-2	Structural Support for Criterion (a)(1) components	Provide structural support and/or functional support to safety related components.
C-3	Shelter, Protection	Provide shelter/protection to safety related components.
C-4	Fire Barrier	Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
C-5	Shutdown Cooling Water	Provide source of cooling water for plant shutdown.
C-6	Missile Barrier	Provide missile barrier (internally or externally generated).
C-7	Structural Support for Criterion (a)(2) and (a)(3) components	Provide structural support and/or functional support to non-safety related components.
C-8	Flood Barrier	Provide flood protection barrier (internal and external flooding event).
C-9	Gaseous Release Path	Provide path for release of filtered and unfiltered gaseous discharge.
C-10	Absorb Neutrons	Absorb neutrons.
C-11	Pipe Whip Restraint/HELB Shielding	Provide pipe whip restraint/Provide shielding against high-energy line breaks.
C-12	Heat Sink	Provide heat sink during station blackout or design-basis accidents.
C-13	Direct Flow	Provide spray shield or curbs for directing flow (e.g., safety injection flow to containment sump).
C-14	Shielding	Provide shielding against radiation.
C-15	Expansion/Separation	Provide for thermal expansion and/or seismic separation.
Electrical Intended Functions		
E-1	Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.
E-2	Electrical Insulation	Insulate and support an electrical conductor.
Mechanical Intended Functions		
M-1	Pressure Boundary	Provide pressure-retaining boundary (so that sufficient flow at adequate pressure is delivered or undesirable spatial interactions are prevented).
M-2	Filtration	Provide filtration.
M-3	Throttle	Provide flow restriction/throttle.
M-4	Structural Support	Provide structural support/ seismic integrity.
M-5	Heat Transfer	Provide heat transfer.
M-6	Thermal Insulation	Provide insulation/thermal resistance.
M-7	-	Not used.
M-8	Spray Pattern	Provide adequate flow in a properly distributed spray pattern.
M-9	Core Support	Provide support and orientation of the reactor core (i.e., the fuel assemblies).
M-10	Control Rod Support	Provide support, orientation, guidance, and protection of the control rod assemblies.

Table 2.0-1 (continued) Intended Function Abbreviations and Definitions

Abbrev.	Intended Function	Definition
Mechanical Intended Functions (continued)		
M-11	Core Flow Distribution	Provide a passageway for the distribution of the reactor coolant flow to the reactor core (i.e., the fuel assemblies).
M-12	Incore Instrumentation Support	Provide a passageway for support, guidance, and protection for incore instrumentation.
M-13	Secondary Core Support	Provide a secondary core support for limiting the core support structure downward displacement.
M-14	Reactor Vessel Shielding	Provide gamma and neutron shielding for the reactor pressure vessel.

2.1 SCOPING AND SCREENING METHODOLOGY

Scoping is the initial step in the HNP License Renewal technical evaluation methodology. Scoping is performed to identify SSCs that perform intended functions within the scope of License Renewal as required by 10 CFR 54.4. The scoping methodology is described in Subsection 2.1.1 below.

Screening is the second step of the HNP technical evaluation methodology and addresses the requirements of an IPA defined in 10 CFR 54.21(a). The HNP screening process includes: (1) a review of the systems and structures identified as in scope for License Renewal to identify the specific components of those structures and systems that support the functions of 10 CFR 54.4, and (2) a review of the components and structural components to identify those that satisfy the criteria of 10 CFR 54.21(a)(1). The screening process identifies those structures and components that are subject to an aging management review. The screening process is described in Subsection 2.1.2.

In accordance with Appendix A of NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, (hereinafter referred to as NUREG-1800 or the SRP-LR), a review of NRC Generic Safety Issues (GSIs) is required to satisfy a finding per 10 CFR 54.29. GSIs that involve issues related to License Renewal aging management reviews or time-limited aging analysis evaluations are to be addressed in the License Renewal Application. Subsection 2.1.3 provides the results of this review.

The NRC staff has identified several issues for which additional regulatory clarification was found necessary; these are referred to as License Renewal Interim Staff Guidance (LR-ISG) issues. Subsection 2.1.4 discusses how applicable LR-ISG issues were addressed within the HNP License Renewal review.

2.1.1 SCOPING

SSCs that satisfy the criteria of 10 CFR 54.4(a)(1), (2), or (3) are within the scope of License Renewal. Specifically, 10 CFR 54.4 states:

(a) Plant systems, structures, and components within the scope of this part are—

(1) *Safety related systems, structures, and components 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 that could result in potential offsite exposure comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter as applicable.

(2) *All non-safety related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section.*

(3) *All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrated compliance with the Commission's regulation 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 CFR50.62), and station blackout (10 CFR 50.63).*

(b) *The intended functions that these systems, structures, and components must be shown to fulfill in* §54.21 *are those functions that are the bases for including them within the scope of LR as specified in paragraphs (a)(1)-(3) of this section.*

Identification of SSCs that fall within the scope of the Rule at HNP is performed at the system or structure level, and is consistent with the guidance found in NEI 95-10. The initial step in the process is to compile a list of SSCs for scoping. Major structures and plant components such as pumps, valves, tanks, heat exchangers, and instruments at HNP are assigned unique component numbers that are maintained in a controlled database called the PassPort Equipment Database (PassPort EDB or EDB). Each HNP system is identified in EDB by a unique system number, and each component in a given system is assigned a unique EDB component identification number. An initial listing of systems was obtained from PassPort EDB. PassPort EDB also contains a designation of quality class for each component. Those components required to perform an environmental qualification (EQ) function are also identified in PassPort EDB. The process for developing the quality class and EQ information is well defined and controlled under a 10 CFR 50, Appendix B, quality assurance program. Initially in the License Renewal review, PassPort EDB component-level information was reconciled against the scoping criteria of the Rule. Components with the appropriate classification were correlated to corresponding scoping criteria from the Rule. The component level scoping results derived from the use of PassPort EDB are augmented or modified by a review of the FSAR, and other plant documentation that constitute the CLB, and the topical evaluations that address generic License Renewal scoping issues. The result is a comprehensive scoping process that bounds the criteria of 10 CFR 54.4 and is consistent with industry and regulatory guidance.

The HNP scoping process employed a multi-faceted approach to ensure that Systems, Structures, and Components (SSCs) meeting the criteria of 10 CFR 54.4(a)(1) through (a)(3) have been identified.

The process of determining which systems and structures are within the scope of License Renewal involved a review of the FSAR and other documents containing descriptive and functional information. The FSAR contains information such as the design bases, design codes and standards, safety classifications, design evaluations, descriptions, and safety analyses applicable to plant systems and structures. This information was used in conjunction with other Current Licensing Basis (CLB) information and plant documents, such as Design Basis Documents, to determine if a particular system or structure function aligns with the criteria of 10 CFR 54.4(a)(1) through (a)(3). In addition, the PassPort Equipment Data Base (PassPort EDB) was evaluated to determine its potential as a scoping tool for License Renewal. PassPort EDB functions as the component-level Q-List for HNP and identifies the items to which the Quality Assurance Program applies. PassPort EDB contains component-level quality classifications that were derived from system and structure design and functional data required to meet CLB commitments. Component quality classification determinations typically involve a functional evaluation of the parent system by reviewing the system-level Q-List, Design Basis Documents, System Descriptions, FSAR, Safety Evaluation Report, Technical Specifications, and operating procedures. Control and revision of component quality classification information within PassPort EDB is governed by procedure. Therefore, it was concluded that the component-level information could be used to identify SSCs within the scope of License Renewal. In addition to the review previously described, topical evaluations were performed to identify additional systems within the scope of License Renewal. Topical evaluations addressed the following areas and included a review of applicable CLB documentation:

- Anticipated Transient Without Scram (ATWS),
- Fire Protection,
- Pressurized Thermal Shock (PTS),
- Station Blackout (SBO), and
- 10 CFR 54.4(a)(2) Scoping.

The results from these reviews have been compiled and evaluated to identify HNP SSCs in the scope of License Renewal. No topical evaluation was required for EQ; because, as previously discussed, the components required to perform an EQ function are identifed in PassPort EDB.

The HNP Civil/Structural scoping process included additional activities beyond the scoping process defined above, to ensure all structures within the scope of License Renewal were identified. This review also was performed based on design information found in the FSAR, Design Basis Documents, Maintenance Rule Database, PassPort EDB, and License Renewal topical reviews. The primary consideration was that any structure or component that houses or provides physical or functional support for components within the scope of License Renewal is itself in the scope of License Renewal. Component location information in PassPort EDB was used to identify structures which house or support License Renewal components. Structure intended functions were then associated with the intended functions of the components located in the structure. This process was used to identify in-scope structures and to derive the associated License Renewal intended function. For example, if a specific structure contains safety related components, the civil intended functions related to supporting and protecting safety related equipment were associated with the structure. Using this methodology, components within the specific structure and their associated EDB quality classifications were identified, and the corresponding civil intended functions were assigned to the structure. Those structures, for which no License Renewal intended functions were identified, were determined to be outside the scope of License Renewal.

The process of determining the intended functions for a system or structure involved a review of CLB information, mainly the FSAR. The FSAR contains information such as the design bases, compliance with codes and standards, safety classifications, design evaluations, descriptions of system operation, descriptions of system inter-dependencies, and safety analyses. This information was used in conjunction with other information from other sources, such as Design Basis Documents (DBD) and procedures, to identify system/structure intended functions. As an adjunct to this evaluation, a review of the component level intended functions derived from PassPort EDB classifications was used to ensure that a complete set of system and structure intended functions were captured. The License Renewal topical evaluations for ATWS, Fire Protection, PTS, 54.4(a)(2) Scoping, and SBO also were used to provide insight into system/structure intended functions related to those events.

As a confirmation of the scoping results derived from the above scoping process for systems and structures, the results were compared to the systems and structures in the scope of the Maintenance Rule at HNP. Differences were evaluated to assure that the list of SSCs in scope for License Renewal was complete and accurate.

As a check on the results of the scoping process, EDB systems that were evaluated as not being within the scope of License Renewal were reviewed to assure a reasonable basis for their exclusion existed.

Based on the results of the above scoping process, system and structure descriptions and intended functions were identified; and the systems and structures were aligned with one or more of the scoping criteria from 10 CFR 54.4(a).

License Renewal scoping drawings have been developed to facilitate NRC staff review by depicting the mechanical components that support system intended functions and, therefore, are within the scope of License Renewal. Applicable drawings are identified by system in Section 2.3.

Details of the scoping process for safety related SSCs, in accordance with 10 CFR 54.4(a)(1), are provided in Subsection 2.1.1.1 below. Details of the scoping process for non-safety related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for safety related SSCs, in accordance with 10 CFR 54.4(a)(2), are provided in Subsection 2.1.1.2. Details of the scoping process for SSCs relied on to demonstrate compliance with one of the regulated events, in accordance with 10 CFR 54.4(a)(3), are provided in Subsection 2.1.1.3.

2.1.1.1 Safety Related Criteria Pursuant to 10 CFR 54.4(a)(1)

10 CFR 54.4(a)(1) pertains to safety related SSCs and states that 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:

1. The integrity of the reactor coolant pressure boundary;
2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
3. The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter as applicable.

The administrative controls used to determine PassPort EDB quality classifications apply the Quality Class A designation to SSCs that are necessary, either actively or passively, to assure the accomplishment of the safety related functions. Items that do not perform a safety related function but whose failure could prevent the satisfactory accomplishment of a safety related function during or following design basis accidents and transients were also classified as Quality Class A unless a non-safety related classification had been justified. The administrative controls used to determine PassPort EDB quality classifications define the term "safety related" as follows:

> A term applied to those plant features relied upon during or following a design basis event to ensure:
> - The integrity of the reactor coolant pressure boundary,
> - The capability to shut down the reactor and maintain it in a safe shutdown condition, or
> - The capability to prevent; or mitigate the consequences of events which could result in off-site exposure comparable to the guideline exposures of NRC Regulation 10 CFR 50.67.

A comparison of the preceding definition of Quality Class A against 10 CFR 54.4(a)(1) finds that these criteria are consistent with the exception that the Rule includes references to 10 CFR 50.34(a)(1) (associated with applications for an initial operating license) and 10 CFR 100.11 (determination of exclusion area, low population zone, and population center). At HNP, 10 CFR 50.67 (alternative source term) guidelines are applicable under the CLB; and components credited with preventing and mitigating off-site exposures to less than 10 CFR 50.67(b)(2) limits are designated Quality Class A.

For the purposes of License Renewal, any system, including support systems, or structure that contains one or more safety related components was considered to be a safety related system or structure. Therefore, EDB Quality Class A is determined to be consistent with the scoping criteria of 10 CFR 54.4(a)(1), such that this designation is sufficient to facilitate scoping of HNP SSCs under 10 CFR 54.4(a)(1).

Based on the above, the scoping process to identify safety related SSCs for HNP License Renewal satisfies the criteria in 10 CFR 54.4(a)(1).

2.1.1.2 Non-Safety Related Criteria Pursuant to 10 CFR 54.4(a)(2)

10 CFR 54.4(a)(2) states that 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 safety related SSCs.

The License Renewal methodology at HNP employed a multi-step process to identify the 10 CFR 54.4(a)(2) system and structures. The methodology is consistent with NRC and industry guidance on the identification and treatment of SSCs which meet 10 CFR 54.4(a)(2). A simplified graphical display of the non-safety related scoping process is provided in Figure 2.1-1. The process included the following activities that are further described below:

- Identifying structures and systems that meet 10 CFR 54.4(a)(2) criteria based on their PassPort EDB quality classifications. The applicable structures meeting the criteria, as well as, the systems containing and structures housing the components meeting the criteria, are in scope.

- Identifying non-safety related SSCs meeting 10 CFR 54.4(a)(2) based on the Current Licensing Basis and based on site-specific and industry operating experience. Systems and structures meeting these criteria are in scope.

- Identifying structures and systems meeting 10 CFR 54.4(a)(2) by applying NRC scoping guidance for: (1) non-connected, non-safety related systems and structures meeting 10 CFR 54.4(a)(2) based on spatial interactions, and (2) non-safety related systems meeting 10 CFR 54.4(a)(2) based on piping seismically connected to safety related systems. Systems and structures meeting the criteria provided in the NRC scoping guidance are in scope for 10 CFR 54.4(a)(2).

10 CFR 54.4(a)(2) Scoping Based on Quality Classification

HNP has made extensive use of quality classifications to identify SSCs that have functional or physical interactions with safety related SSCs. These quality classifications have been assigned to non-safety related components and documented in PassPort EDB. PassPort EDB quality classification designations have been reconciled with License Renewal scoping criteria to provide a means for scoping of License Renewal components and associated systems/structures. Components with quality classifications that correspond to 10 CFR 54.4(a)(2) scoping criteria include: (1) components that are non-safety related but are essential to the functioning of a safety related system, (2) components that are seismically designed in accordance with Regulatory Guide 1.29, Position C.2 to prevent adverse interactions with safety related equipment during an earthquake, and (3) components in those portions of systems whose failure may have an adverse effect on a nearby safety related component and are, therefore, seismically supported and seismically designed.

In summary, non-safety related systems having components with the appropriate quality classifications have been included in the scope of License Renewal in accordance with 10 CFR 54.4(a)(2).

10 CFR 54.4(a)(2) Scoping Based on Current Licensing Basis Review and Operating Experience

In addition to scoping on the basis of quality designations, an extensive review was performed to identify additional candidates for inclusion based on the Current Licensing Basis (CLB) and operating experience. The methodology for this review involved the following.

First, the bases for 10 CFR 54.4(a)(2) scoping considered the following criteria:

- Consistent with regulatory guidance, consideration of hypothetical failures that could result from system interdependencies that are not part of the plant CLB, or that have not been previously experienced, is not required.

- The HNP design and licensing bases include instances of non-safety related equipment, augmented with a suitable surveillance or monitoring program, used to maintain safety related equipment or plant conditions within limits consistent with assumed initial conditions of events. For example, plant chemistry is assumed to be within the specifications maintained by the chemistry program based upon regular monitoring and analysis. In these instances, it is the monitoring or surveillance program that is primarily credited with ensuring the appropriate initial conditions exist, rather than the operation of any non-safety related equipment. The function of non-safety related equipment to establish initial conditions for equipment operation or accident assumptions does not constitute the basis for inclusion in the License Renewal scope under 10 CFR 54.4(a)(2).

- Malfunctions of non-safety related equipment that result in an actuation of safety related equipment do not constitute a basis for inclusion under 10 CFR 54.4(a)(2), since these malfunctions do not result in the loss of a safety related function. For example, loss of a condensate pump might result in a reactor trip and resultant challenge to plant safety systems. However, this would not result in the loss or degradation of any of the associated safety related equipment.

Second, after eliminating the above categories of SSCs, the following steps were performed:

- The HNP design and licensing basis information was reviewed to identify non-safety related systems that function to directly support a safety related system and whose failure could prevent the performance of a required intended function. Sources of this information include Design Basis Documents, the FSAR, EDB, and docketed correspondence. The specific function/interaction required of the non-safety related system was also identified. Any systems identified in this category were designated as within the scope of License Renewal per the 10 CFR 54.4(a)(2) criteria.

- The HNP design and licensing basis information was reviewed to identify non-safety related SSC interactions with safety related SSCs that could prevent the performance of a required intended function. Sources of this information include Design Basis Documents, plant drawings, the FSAR, other CLB documentation, as well as PassPort EDB. Specific interactions that may affect the function of safety related SSCs were identified.

- The NRC guidance for scoping states that an applicant for License Renewal should review the site and industry-wide operating experience, as appropriate, to determine those non-safety related systems, structures and components that are the initial focus of the License Renewal review. In view of this guidance, the HNP scoping review considered relevant discussions of 10 CFR 54.4(a)(2) from other License Renewal applications as well as HNP-specific plant documentation, including docketed correspondence and Licensee Event Reports. These reviews of industry and HNP operating experience did not identify additional systems required to be brought in the scope of License Renewal for 10 CFR 54.4(a)(2). Industry operating experience with regard to the hazards posed by systems containing air/gas as a process medium is discussed in the following subsection that deals with current scoping guidance.

10 CFR 54.4(a)(2) Scoping Based on NRC Scoping Guidance for Spatial Interactions and Seismic-Connected Piping

Current scoping guidance documented in Appendix F of NEI 95-10 states:

> "When demonstrating that failures of nonsafety-related SSCs would not adversely impact on the ability to maintain intended functions, a distinction must be made between nonsafety-related SSCs that are connected to safety-related SSCs and those that are not connected to safety-related SSCs. For a nonsafety-related SSC that is connected to a safety-related SSC, the nonsafety-related SSC should be included within the scope of License Renewal up to the first seismic anchor past the safety/non-safety interface."

Important in identifying non-safety related systems having potential adverse spatial interactions with safety related SSCs is identifying areas housing safety related SSCs. Since 10 CFR 54.4(a)(2) pertains only to interactions with safety related SSCs, such interactions are confined to the areas that house safety related equipment. Structures or areas having no safety related SSCs are not considered pertinent. For HNP, FSAR Table 3.2.1-1 identifies Seismic Category I and Quality Class A (safety related) structures which house or protect safety related SSCs. FSAR Section 3.8.4 also lists structures designed to Seismic Category I requirements.

Based upon a review of these sources, the following HNP structures were identified as housing safety related equipment or designed to Seismic Category I requirements:

- Containment Building
- Reactor Auxiliary Building
- Auxiliary Reservoir Channel
- Auxiliary Dam and Spillway
- Auxiliary Reservoir Separating Dike
- Cooling Tower Makeup Water Intake Channel
- Diesel Generator Building
- Main Dam and Spillway
- Diesel Fuel Oil Storage Tank Building
- Emergency Service Water and Cooling Tower Makeup Intake Structure
- Emergency Service Water Discharge Channel
- Emergency Service Water Discharge Structure
- Emergency Service Water Intake Channel
- Fuel Handling Building
- Emergency Service Water Screening Structure
- Turbine Building
- Tank Area/Building
- Waste Processing Building

- Selected Underground Electrical Duct Runs and Manholes (included with the Yard Structures for License Renewal)

Scoping based on spatial interactions is addressed in the following paragraphs; scoping based on seismic-connected piping is addressed beginning on page 2.1-12.

Spatial Interactions

HNP took an expansive approach for determining where spatial relationships might exist between non-safety related and safety related SSCs. HNP used the preventive option, which requires that non-connected, non-safety related systems be brought within the scope of License Renewal to protect safety related SSCs from the consequences of failures of the non-safety related systems. The mitigative option of protecting safety related systems was not used. Except for air/gas-filled systems, the approach used was that piping and HVAC systems with non-safety related components located within a safety related structure were included in the scope of License Renewal unless a specific evaluation was performed and concluded a spatial interaction was not credible.

With regard to air/gas-filled systems, NEI 95-10 states that:

> "Air and gas systems (non-liquid) are not a hazard to other plant equipment. Industry operating experience (such as NUREG-1801, industry tools documents and other LRA SERs) for systems containing air/gas, has shown no failures due to aging that have adversely impacted the accomplishment of a safety function. In addition, there are no credible aging mechanisms for air/gas systems with dry internal environments. A review of site-specific operating experience should be performed to verify this assumption. The results of this site-specific review should be maintained in a retrievable and auditable form. Additionally, components containing air/gas cannot adversely affect safety related SSCs due to leakage or spray. Therefore, these systems are not considered to be in scope for 54.4(a)(2)."

HNP has performed a site-specific review to verify that there are no credible aging mechanisms for air/gas systems with dry internal environments. Based on this review, leakage and spray are not a consideration for 10 CFR 54.4(a)(2) scoping for air/gas systems. However, structural supports for air and gas systems located in Seismic Category I structures have been included in the scope of License Renewal to prevent physical impacts on safety-related equipment during a seismic event.

For the purposes of identifying potential spatial interactions, if a structure houses safety related SSCs only in a limited area, then non-safety related spatial interactions may be limited to only that area. Area-specific analyses were performed to eliminate plant buildings or areas from consideration in the evaluation of spatial interactions. These analyses are summarized in the following paragraphs.

A portion of the Fuel Handling Building has been included in a structure designated as Outside the Power Block (OPB) Structures. The OPB Structures contain no safety related SSCs. A non-safety related system that is located in the OPB Structures is not required to be included in the scope of License Renewal for 10 CFR 54.4(a)(2), because it has no potential spatial interactions with a safety related SSC. However, the OPB Structures include seismically-designed retaining walls, that meet 10 CFR 54.4(a)(2) requirements, and the unfinished Unit 2 Containment concrete mat, which was determined to meet 10 CFR 54.4(a)(2) requirements because it provides support to a portion of the retaining walls.

An evaluation was performed of components classified as safety related in PassPort EDB and located in the Turbine Building (TB). The components include Feedwater System flow transmitters, the Feedwater Regulating Valves and associated bypass valves, Main Steam Supply System pressure transmitters, and Auxiliary Steam System excess flow check valves. The evaluation of these components determined that they do not meet the License Renewal definition of safety related. In addition, an evaluation and walkdown of the Diesel Generator Service Water Pipe Tunnel, and attached Class I electrical cable area located above the pipe tunnel, was performed. This portion of the TB is Seismic Category I and safety related. The tunnel is completely enclosed with a door at each end. The Emergency Service Water System piping and piping components (valves, flanges, etc.) are the only mechanical components in the tunnel. There are no other safety related or non-safety related systems in the tunnel. The tunnel contains several conduit systems for tunnel lighting and security/fire door alarms. A walkdown did not reveal any other systems which may have a spatial relationship with the Emergency Service Water System piping. In summary, there are no non-safety related systems that are nearby safety related SSCs in the tunnel area including the Class I electrical cable area. Outside of the tunnel and cable areas, there are no other SSCs meeting the 10 CFR 54.4(a)(1) definition of safety related. Therefore, no systems in the Turbine Building are brought into scope per the current guidance regarding spatial interactions.

An evaluation was performed of components classified as safety related in PassPort EDB and located in the Waste Processing Building (WPB). The components include Waste Gas Decay Tanks and associated piping and valves and radiation monitor components. The evaluation of these components determined that they do not meet the License Renewal definition of safety related. In addition, an evaluation and walkdown of Room W262, and adjacent areas, was performed, and it was determined that there are non-safety related systems located in the vicinity of safety related SSC associated with these areas. These non-safety related systems have been brought into scope of License Renewal. However, based upon structure boundaries, Room W262 is considered part of the FHB rather than the WPB. Therefore, these interactions are associated with the FHB. Based on the above, it is concluded that: (1) non-safety related systems that may interact with safety related

SSCs in and near room W262 have been included in scope, and (2) there are no safety related SSCs in the bounds of the WPB as defined for License Renewal.

The Yard Structures contain components not specifically located in a defined building, such as, safety related manholes, duct banks, and protective concrete mats containing or protecting buried safety related cable. There are numerous non-safety related components in the Yard area. The electrical manhole design inherently precludes spatial interactions such as falldown from components located nearby and above the manhole. FSAR Section 3.4 states that the electrical manholes and duct runs are capable of normal function while completely flooded. Based on a review of Yard Structures, there are no non-safety related systems meeting the requirements of 10 CFR 54.4(a)(2), which could affect safety related cable in electrical manholes.

The Emergency Service Water and Cooling Tower Makeup Intake Structure is a safety related structure. Adjacent to this structure is the Cooling Tower Makeup Strainer Pit. The safety related components in the Emergency Service Water System are separated from the non-safety related components in the Cooling Tower Makeup Strainer Pit by a reinforced concrete enclosure. Therefore, the design of the Emergency Service Water and Cooling Tower Makeup Intake Structure precludes spatial interactions with safety related components.

The Reactor Auxiliary Building is a safety related structure. For this structure, area-specific evaluations were performed. These areas included the kitchen associated with the Main Control Room, the Hot Machine Shop, three Post Accident Sampling System Rooms, and elevator areas. Evaluations determined that components located in these limited areas are not located in the vicinity of any safety related equipment. Therefore, non-safety related equipment located in these areas are not included in scope for 10 CFR 54.4(a)(2).

Structure-to-structure interactions were evaluated. Interaction between structures is discussed in HNP FSAR Section 3.7.2.8A. Based on the evaluation of structure-to-structure interactions, it was concluded that the collapse of non-Seismic Category I structures will not impair the integrity of adjacent Seismic Category I structures or components.

Seismic-Connected Piping

10 CFR 54.4(a)(2) guidance states that, when demonstrating that failures of non-safety related SSCs would not adversely impact on the ability to maintain intended functions, a distinction must be made between non-safety related SSCs that are connected to safety related SSCs and those that are not connected to safety related SSCs. For non-safety related systems that are connected to safety related SSCs, the non-safety related system should be included within the scope of License Renewal up to the first seismic anchor past the safety/non-safety interface. Systems having components credited as being seismically connected are included in the scope of License Renewal.

HNP FSAR Section 3.7.3.13 discusses the interaction of other piping with seismic Category I piping. The following quotes are from that discussion:

> In the case of non-Seismic Category I piping systems attached to Seismic Category I piping systems, the dynamic effects were included in the modeling of the Seismic Category I piping up to the first anchor or system of restraints which decouples the piping.

and

> It should be noted that all seismic/non-seismic interface restraints are located in seismically analyzed structures thereby assuring that collapse of the restraint structure will not occur.

Therefore, non-safety related systems relied upon to provide seismic support for safety related SSCs were evaluated using the following rationale.

- Safety related piping is in the scope of License Renewal per 54.4(a)(1).
- Safety related piping is located in Seismic Category I structures at HNP.
- Therefore, the non-safety related/safety related boundary is located in a Seismic Category I structure.
- All piping systems in Seismic Category I structures are in the scope of License Renewal as discussed with respect to spatial interactions above.

Thus, it follows that non-safety related, seismically-connected piping is in the scope of License Renewal and enveloped by the HNP scoping methodology.

As stated above in the spatial interaction discussion, HNP air/gas piping systems do not have spatial interactions. However, certain air/gas piping systems have non-safety related piping connected to safety related piping. These air/gas piping systems with seismically-connected piping include the Instrument Air System, Service Air System, Bulk Nitrogen Storage System, Hydrogen Gas System, and Penetration Pressurization System. These systems were evaluated by reviewing stress calculations, the PassPort EDB quality class designation, the FSAR, and system drawings. This ensured that non-safety related piping connected to safety related piping in these air/gas systems were included within the scope of License Renewal up to the first seismic anchor or equivalent anchor past the safety/non-safety interface.

<u>10 CFR 54.4(a)(2) Scoping Summary</u>

The HNP scoping methodology for scoping against 10 CFR 54.4(a)(2) makes use of extensive component-level quality data combined with a review of the CLB, operating experience and other pertinent information, to identify SSCs that have potentially adverse spatial interactions with safety related SSCs. Non-safety related systems were also reviewed for potential system interdependencies with safety related systems. The result is a conservative and comprehensive approach consistent with the License Renewal Rule and NRC staff guidance, regarding scoping of 10 CFR 54.4(a)(2).

2.1.1.3 Other Scoping Pursuant to 10 CFR 54.4(a)(3)

10 CFR 54.4(a)(3) states that SSCs relied upon 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) are within the scope of License Renewal. Current licensing basis evaluations have been performed to identify and document the SSCs credited for compliance with each of these regulations. For these SSCs, the system/structure level intended function is that it is relied upon in safety analyses or evaluations to demonstrate compliance with NRC requirements for the event in question. Systems or structures that have one or more components credited for demonstrating compliance with one of the regulated events are within the scope of License Renewal per the §54.4(a)(3) criteria.

Scoping based on each of the regulated events is described in the following paragraphs.

2.1.1.3.1 Fire Protection

The SSCs at HNP that support compliance with 10 CFR 50.48 are within the scope of License Renewal. To determine the SSCs required for fire protection within scope, information in PassPort EDB and other relevant plant documentation was reviewed. PassPort EDB provides a comprehensive list of those components providing fire suppression, fire detection, electrical power supply to fire protection equipment, fire barriers/penetration seals, and alternate safe shutdown. Any system with components classified as supporting fire protection in PassPort EDB was considered in scope. Also, any systems, with components credited in plant documents as required to support safe shutdown following a fire were considered in scope. Additionally, the structures that house systems in scope for fire protection are themselves in scope for fire protection.

The steps to identify SSCs relied on for fire protection to meet 10 CFR 54.4(a)(3) are:

1. PassPort EDB classification criteria identifying systems required to detect and mitigate fires and to achieve post-fire safe shutdown were reviewed to identify systems credited for compliance with 10 CFR 50.48. In addition, structures that house the components of these systems were identified.

2. PassPort EDB information was supplemented by a review of the FSAR, docketed information pertaining to compliance with 10 CFR 50.48, including HNP responses to NRC Branch Technical Position CMEB 9.5-1, "Guidelines for Fire

Protection for Nuclear Power Plants," criteria; the NRC staff's Safety Evaluation Report for HNP; the Fire Protection Program Manual; the Safe Shutdown Analysis in Case of Fire, including the Fire Hazards Analysis; the Safe Shutdown Separation Analysis; the Fire Protection Equipment Q-List; Safe Shutdown Flow Diagrams; Design Basis Documents; and related plant procedures.

3. Based on the above, License Renewal intended functions relative to the criteria of 10 CFR 54.4(a)(3) for fire protection were identified for each system and structure determined to meet this criteria.

The scoping process to identify SSCs relied upon and/or specifically committed to for fire protection for HNP is consistent with and satisfies the criteria in 10 CFR 54.4(a)(3).

2.1.1.3.2 Environmental Qualification

10 CFR 50.49(b) defines electric equipment important to safety that is required to be environmentally qualified to mitigate certain accidents that result in harsh environmental conditions in the plant. An EQ Master List of Equipment (EQML) has been developed in accordance with the requirements of 10 CFR 50.49(b) based on: 1) a review of the HNP design basis accidents, 2) the resulting environmental service conditions, 3) the functional requirements of the systems, 4) the functional requirements of individual components required to isolate the break or mitigate or monitor the effects of the accident, and 5) the physical location of the components. This list is maintained within PassPort EDB, and identifies the equipment within the scope of the HNP EQ Program.

The steps to identify SSCs relied on for environmental qualification to meet 10 CFR 54.4(a)(3) are:

1. PassPort EDB identifies components that are on the HNP EQML in accordance with 10 CFR 50.49. PassPort EDB was used as an input document for scoping of SSCs. Any system that contained one or more components designated as EQ-related in EDB was considered in scope due to EQ. Also, structures that house the components of the EQML were identified.

2. Based on the above, a License Renewal intended function relative to the criteria of 10 CFR 54.4(a)(3) for EQ was identified for each system and structure determined to meet this criteria.

The scoping process to identify systems and structures relied upon and/or specifically committed to for EQ for HNP is consistent with and satisfies the criteria in 10 CFR 54.4(a)(3). Note that qualified life analysis of EQ components may meet the requirements for Time-Limited Aging Analyses (TLAAs). EQ-related TLAAs are discussed in Section 4.4.

2.1.1.3.3 Anticipated Transients Without Scram

HNP design features related to Anticipated Transients Without Scram (ATWS) are within the scope of License Renewal because they are relied on to meet the requirements of 10 CFR 50.62. 10 CFR 50.62 required each Pressurized Water Reactor to have equipment from the sensor output to final actuation device, that is diverse from the Reactor Trip System, to automatically initiate the Auxiliary Feedwater System and initiate a turbine trip under conditions indicative of an ATWS. HNP complied with this requirement by installing ATWS Mitigation System Actuation Circuitry (AMSAC). Systems that provide input into AMSAC or respond to an output from AMSAC are part of the commitment to 10 CFR 50.62 and are within the scope of License Renewal. Likewise, the structures that house AMSAC components are part of the commitment to 10 CFR 50.62 and are thereby within the scope of License Renewal.

The steps to identify SSCs at HNP relied upon for ATWS mitigation to meet the requirements of 10 CFR 54.4(a)(3) are outlined below:

1. A review was performed to identify the SSCs credited with mitigating a postulated ATWS event. The systems that interface with and the structures that house these SSCs were the focus of the review.

2. Based on the above, the License Renewal intended function relative to the criteria of 10 CFR 54.4(a)(3) for ATWS events was identified for each system and structure determined to meet this criteria.

The scoping process to identify SSCs relied upon and/or specifically committed to for a postulated ATWS event for HNP is consistent with and satisfies the criteria in 10 CFR 54.4(a)(3).

2.1.1.3.4 Station Blackout

PassPort EDB quality classifications that have been assigned to components credited with compliance with Station Blackout requirements were used to identify the applicable equipment. To augment PassPort EDB-identified components, additional reviews of the Station Blackout Coping Analysis Report and other plant documents and procedures were performed.

The steps to identify systems and structures at HNP relied upon for SBO to meet the requirements of 10 CFR 54.4(a)(3) are outlined below:

1. PassPort EDB, FSAR, Station Blackout Coping Analysis Report, Safe Shutdown Flow Diagrams, plant procedures, and scoping guidance regarding additional equipment required to recover from an SBO were reviewed to determine the scope of systems and structures required for SBO.

2. Based on the above, a License Renewal intended function relative to the criteria of 10 CFR 54.4(a)(3) for a postulated SBO was identified for each system and structure determined to meet this criteria.

The scoping process to identify SSCs relied upon and/or specifically committed to for a postulated SBO for HNP is consistent with the criteria of 10 CFR 54.4(a)(3).

For HNP, including equipment required to recover from an SBO brought into scope various electrical components and associated civil structures associated with providing offsite power via the switchyard to plant electrical buses.

The preferred path of offsite power when recovering from an SBO is through two start-up transformers (SUTs) from the power grid via the 230 kilovolt (KV) switchyard. The high-voltage winding of SUT 1A is fed from the North 230KV bus, and the high-voltage winding of SUT 1B is fed from the South 230KV bus. The 230KV switchyard has multiple sources of supply from the Progress Energy transmission and distribution system. The first isolation devices upstream of the SUTs are the 230KV power circuit breakers (PCBs). The PCBs demarcate the 230KV Switchyard from the Progress Energy transmission and distribution system and, for the purposes of License Renewal, represent the scoping boundary for the preferred source of offsite power. The PCB boundary pairs for SUT 1A are 52-2 and 52-3 and for SUT 1B, are 52-13 and 52-14. Refer to Figure 2.1-2 for a simplified system diagram showing these power paths.

An alternate path of offsite power when recovering from an SBO is through the Unit Auxiliary Transformers (UATs) by backfeeding the Main Transformers. Prior to backfeeding the Main Transformers, the disconnect links to the Main Generator must be removed. The Main Transformers are fed from the 230KV Switchyard. PCBs represent the scoping boundary for the alternate source of offsite power. The PCB boundary pairs for the UATs are 52-7 and 52-9.

The passive, long-lived electrical components comprising the restoration power path for offsite power that are subject to an aging management review are as follows:

- Generator Isolated Phase (Iso-Phase) Bus
- Non-Segregated 6.9KV Phase Bus
- High-Voltage Insulators
- Switchyard Bus
- Insulated Cables and Connections
- Transmission Conductors and Connections

2.1.1.3.5 Pressurized Thermal Shock

10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," requires that licensees evaluate the reactor vessel beltline materials against specific criteria to ensure protection against brittle fracture. HNP has

documented compliance with 10 CFR 50.61 via several docketed letters provided in response to NRC Generic Letter 92-01, Revision 1, and Supplement 1, and in letters addressing the impact on Reactor Vessel materials from capsule analysis performed as part of the HNP Reactor Vessel Surveillance Program and neutron fluence changes resulting from power uprate. Based upon the current analysis for PTS, HNP does not rely on a Regulatory Guide 1.154 analysis to satisfy the PTS Rule. Only the SSCs relied on in the FSAR to demonstrate compliance with 10 CFR 50.61 are included within the scope of License Renewal for the purposes of 10 CFR 50.61. Since the analysis relies only on Reactor Vessel beltline materials, there are no SSCs, other than the Reactor Vessel, that are within the scope of License Renewal as a result of 10 CFR 50.61. Therefore, the Reactor Vessel is within the scope of License Renewal based on compliance with 10 CFR 50.61.

Based on the above, a License Renewal intended function relative to the criteria of 10 CFR 54.4(a)(3) for postulated PTS was identified for the Reactor Vessel.

The scoping process to identify SSCs relied upon and/or specifically committed to for PTS for HNP is consistent with and satisfies the criteria in 10 CFR 54.4(a)(3). Note that PTS is related to reactor pressure vessel embrittlement, which is a Time Limited Aging Analysis (TLAA). The TLAA analysis associated with PTS is discussed in Section 4.2.

2.1.2 STRUCTURE AND COMPONENT SCREENING

This subsection describes the process used at HNP to identify the in-scope structures and components (SCs) that require an aging management review and justifies the process with respect to requirements of an Integrated Plant Assessment (IPA) defined in 10 CFR 54.21(a). In the HNP IPA, the process of identifying SCs subject to AMR is referred to as screening.

The requirement to identify SCs subject to an aging management review is specified in 10 CFR 54.21(a)(1) that states:

> *Each application must contain the following information:*
>
> *(a) An integrated plant assessment (IPA). The IPA must—*
>
> *(1) For those systems, structures, and components within the scope of this part, as delineated in Sec. 54.4, identify and list those structures and components subject to an aging management review. Structures and components subject to an aging management review shall encompass those structures and components—*
>
> *(i) That perform an intended function, as described in Sec. 54.4, without moving parts or without a change in configuration or properties. These structures and components include, but are not*

limited to, the reactor vessel, the reactor coolant system pressure boundary, steam generators, the pressurizer, piping, pump casings, valve bodies, the core shroud, component supports, pressure retaining boundaries, heat exchangers, ventilation ducts, the containment, the containment liner, electrical and mechanical penetrations, equipment hatches, seismic Category I structures, electrical cables and connections, cable trays, and electrical cabinets, excluding, but not limited to, pumps (except casing), valves (except body), motors, diesel generators, air compressors, snubbers, the control rod drive, ventilation dampers, pressure transmitters, pressure indicators, water level indicators, switchgears, cooling fans, transistors, batteries, breakers, relays, switches, power inverters, circuit boards, battery chargers, and power supplies; and

(ii) That are not subject to replacement based on a qualified life or specified time period.

The screening process was performed by discipline: mechanical, civil/structural, and electrical/I&C following an initial screening based on generic equipment types. The screening process for mechanical components is described in Subsection 2.1.2.1; screening for civil structures, in Subsection 2.1.2.2; and for electrical and I&C systems, in Subsection 2.1.2.3.

During the screening process, some SCs were incorporated into commodity groups based on similarity of their design or materials of construction. Use of commodity groups made it possible to address an entire group of SCs with a single evaluation.

2.1.2.1 Mechanical Components

The following steps describe the process used to identify mechanical components subject to aging management review. The process was implemented at HNP as follows:

- Mechanical components and commodities within systems credited with intended functions were identified.

- Components and commodities which perform mechanical component intended functions were identified.

- Components determined to be not subject to an AMR were screened out. These include components that are:
  (a) Active,
  (b) Short lived or replaced based on qualified life or specific time period,
  (c) Not credited with performance of a mechanical intended function,

(d) Excluded by the NRC regulations for License Renewal.

Each system identified during scoping as being within the scope of License Renewal is screened to identify passive mechanical components that support the system intended function. Electrical and I&C components that are within the scope of License Renewal solely because they perform a system pressure boundary function are treated as mechanical component/commodities for the purposes of mechanical screening.

The intended functions for a system are used as input to the screening process. The system intended functions, together with component information in PassPort EDB, the 10 CFR 54.4(a)(2) scoping evaluation, the 10 CFR 54.4(a)(3) regulated event scoping evaluations, and applicable system drawings, were used to identify the passive components requiring Aging Management Review. The following guidelines were applied to this effort:

- Passive component determinations are made in accordance with 10 CFR 54.21(a)(1)(i) and the guidance in NEI 95-10.
- Housings for active components (e.g., pump casings, valve bodies, fan, blower, and damper housings, etc.) that support the component intended function in a passive manner are subject to aging management review.
- Some structures and components, when combined, are considered a complex assembly (e.g., diesel generator starting air skids or heating, ventilating, and air conditioning refrigerant units). Boundaries for such assemblies are established by identifying each structure and component that makes up the complex assembly and determining whether each is subject to aging management review.
- Items that are not subject to replacement based on a qualified life or specified time period per 10 CFR 54.21(a)(1)(ii) are subject to aging management review.
- Major components within mechanical systems may be divided into their subcomponents and screened to a higher level of detail, if deemed appropriate. The major components within the Reactor Coolant System, i.e., the reactor vessel, the reactor vessel internals, the steam generators, reactor coolant pump and pressurizer are screened separately from the remainder of the Reactor Coolant System components. Detailed screening is performed to identify subcomponents that perform or support intended functions.
- At the screening review stage, commodity groups have been added to assure that containment isolation components, thermal insulation, and closure bolting have been addressed for applicable systems.

The following steps describe the process used to identify mechanical components subject to an aging management review. This process utilizes a set of screening filters to identify those components meeting the criteria of §54.21(a)(1). Components screened out by at least one filter are not subject to an aging management review. These filters can be applied in any order to a given component in the interest of efficiency.

1. Mechanical components were subjected to screening based on active/passive function. PassPort EDB uses an "equipment type" designation to catalog components into basic equipment categories. These equipment codes are comparable to the component types presented in NEI 95-10, Appendix B, and provide a means to readily sort many components as to engineering discipline, active/passive determination, and recommended intended function. In addition, several mechanical components may be categorically excluded by 10 CFR 54.21(a)(1)(i) which provides a summary of specific component types determined to be active. Using these documents as a guide, PassPort EDB equipment types were used to screen components as having an active or passive role when performing intended functions. Components having equipment types designated as active were not subject to AMR and were categorically screened out on this basis. Components having equipment types that are indeterminate were reviewed individually to ascertain if they are active and thereby excluded from aging management review requirements.

2. Mechanical components were reviewed to determine if they constituted a complex assembly. A complex assembly is a predominantly active assembly where the performance of its components is closely linked to that of the intended function of the entire assembly, such that testing/monitoring of the assembly is sufficient to identify degradation of these components. Examples of complex assemblies include diesel generators and refrigeration units. Complex assemblies, per se, are considered active and can be excluded from the scope of License Renewal. However, to the extent that complex assemblies include piping or components that interface with external equipment, or components that cannot be adequately tested/monitored as part of the complex assembly, those components must be subject to screening.

3. Mechanical components were reviewed to determine if they were subject to periodic replacement. Those mechanical component types subject to replacement based on a qualified life or specified time period (i.e., are not long-lived components) were screened as not subject to AMR. Replacement programs may be based on vendor recommendations, plant experience, or any means that establishes a specific replacement frequency under a controlled program. A qualified life or specified replacement period does not necessarily have to be based on calendar time. Run time and operational cycles are examples of parameters that may be used to define qualified life or replacement frequency, but are not based on calendar time.

4. Consumable items were evaluated. Consumable parts of a component may be passive, long-lived, and necessary to fulfill an intended function. In accordance with NRC screening guidance of NUREG-1800, Table 2.1-3, consumables may be divided into four basic categories for the purpose of License Renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers,

fire hoses, and air packs. Screening of consumables was either done as part of the component aging management review or the item was excluded based on NRC screening guidance.

5. Component intended functions were identified. Each component subject to aging management review was evaluated to determine each component-level mechanical function performed without moving parts or change in configuration, in fulfilling or supporting system intended functions. These are considered to be mechanical component intended functions. Mechanical component intended functions are listed on Table 2.0-1. In-scope mechanical components with no mechanical intended function are assigned a screening result of "no mechanical intended function," and they are not subjected to aging management review. In a limited number of cases, there are in-scope mechanical components that do not support a mechanical system intended function but are in scope because of their potential to damage safety related components through direct impact during a seismic event. These components do not support a mechanical intended function but remain in-scope because of their EDB classification.

2.1.2.2 Civil Structures

The following steps describe the process used to identify civil/structural components and commodities subject to aging management review. The screening process was performed on each structure identified to be within the scope of License Renewal. This method evaluated the individual SCs included within in-scope structures to identify specific SCs or SC commodity groups that require an aging management review.

The sequence of steps performed on each structure determined to be within the scope of License Renewal was as follows:

1. Owing to the large quantity of typical civil/structural components in the plant, a bulk screening process was employed. Bulk screening involves grouping together typical components and screening them as a single commodity. Implementation of a bulk screening process requires components be grouped by similarity of both construction and function. The source of the commodities list was a combination of those components identified by tag number in the PassPort EDB and those un-tagged components identified through industry experience and review of the plant CLB. Industry sources of experience included NEI 95-10, NUREG-1800, NUREG-1801, and previous License Renewal applications.

   An active/passive determination was performed on the commodity groups based on whether the commodity supports its intended function without moving parts or without a change in configuration or properties.

   A determination of commodity replacement based on a qualified life or specified time period was performed for each commodity type.

To facilitate alignment of plant commodities with NUREG-1801, a correlation was performed to determine which commodities could be associated with a similar NUREG-1801 item.

A set of potential intended functions were developed for each commodity group based on industry experience, previous License Renewal applications, the FSAR, and PassPort EDB. Two major civil/structural intended functions are for providing structural support and providing shelter/protection for mechanical and electrical components. These functions are further divided into providing structural support and/or functional support to safety-related components; providing shelter/protection to safety-related components; and providing structural support and/or functional support to non-safety related components. Functional support to non-safety related components conservatively includes the shelter/protection of 10 CFR 54.4(a)(3) components (e.g., Fire Protection, ATWS, and SBO), as well as, 10 CFR 54.4(a)(2) components. The list of potential intended functions is provided in Table 2.0-1.

2. Civil/structural screening was performed for HNP structures on a structure basis; commodities located within the specific structure being screened were addressed as part of the structure. The HNP License Renewal process was implemented on a discipline basis; for example, mechanical components are addressed within mechanical systems. However, because civil/structural commodities are associated with all systems, they are addressed as part of the structure in which they are located, whether or not they are part of a mechanical or electrical system. For example: a tagged rack in a mechanical or electrical system is considered a system component by EDB; however, it will be screened as a civil/structural commodity within its applicable structure because it performs a civil/structural function. The identification of commodities for a specific structure was performed using PassPort EDB location data, design drawings, general arrangement drawings, penetration drawings, plant modifications, the FSAR, Design Basis Documents, system descriptions, and plant walkdowns.

   EDB equipment types within a specific structure were reviewed, and commodities were assigned to the structure based on that review. For example, if PassPort EDB equipment type "MCC" (motor control center) was identified in a specific structure; and its quality classification was determined to support a License Renewal intended function, civil/structural commodities would be assigned to the structure as follows:

   - Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure) - MCCs are electrical enclosures; therefore, the civil commodity "Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)" is added to the structure).

- Anchorage / Embedment – Because the MCC must be anchored to the structure, the commodities of "Anchorage / Embedment" is included within the structure.

- Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure) – Because electrical component such as the MCC require cables to be routed to them, and cables are routed in trays and conduits, this commodity is added to the structure.

This same methodology was used with components identified by means other than EDB, such as, FSAR discussion of a specific component or design feature, an un-tagged component identified on a plant drawing, or a component observed during a plant walkdown.

3. The commodity-specific intended functions were developed based on comparison of the potential intended functions from the generic commodity groups to the specific intended functions of the structure and PassPort EDB component quality classification. The screening process reviewed EDB equipment types, design drawings, general arrangement drawings, plant modifications, the FSAR, Design Basis Documents, system descriptions, and plant walkdown results within each structure and developed a list of commodities within that structure requiring aging management review. Mechanical and electrical components located in the structure were considered in the assignment of intended functions to the structure. The component intended functions are listed on Table 2.0-1. Those SCs that have a component or commodity intended function that supports a structure intended function are subject to an aging management review.

2.1.2.3 Electrical and I&C Systems

The method used to determine which electrical and I&C components were subject to an aging management review was based on the component commodity group approach consistent with the guidance of NEI 95-10.

The sequence of steps used for identification of electrical and I&C components that require an aging management review is as follows:

1. Using PassPort EDB information, the electrical equipment and component types within the systems and structures determined to be in scope for License Renewal were identified. This step developed a comprehensive list of EDB electrical component types present in the in-scope systems and structures.

2. Using the EPRI License Renewal Electrical Handbook and plant design documentation, electrical equipment and component types within the electrical/ I&C and mechanical systems and structures determined to be in scope for License Renewal were identified in addition to those component types from PassPort EDB identified in step 1. This effort took advantage of industry experience from NEI 95-10, NUREG-1800, and NUREG-1801 and lessons learned from previous License Renewal applications. Plant-specific documentation reviewed included drawings, technical manuals, and plant modification packages.

Steps 1 and 2 developed a comprehensive list of electrical component types present in the in-scope systems and structures.

3. The component types associated with the electrical and I&C systems within the scope of License Renewal were organized into commodity groupings, e.g., circuit breakers, cables, and sensors. In general, grouping of component types used the guidance in NEI 95-10, Appendix B, regarding grouping of components based on similar design and functional characteristics.

4. The electrical and I&C component commodity groups that perform an intended function without moving parts or without a change in configuration or properties, i.e., the screening criterion of 10 CFR 54.21(a)(1)(i), were identified. Commodity groups that have passive functions may be subject to an aging management review and were identified by this step.

5. For the passive electrical and I&C component commodity groups, component commodity groups that are not subject to replacement based on a qualified life or specified time period, i.e., the screening criterion of 10 CFR 54.21(a)(1)(ii), were identified as requiring an aging management review. Commodity group components that are replaced based on qualified life or specified time period (i.e., short-lived components) are not subject to aging management review.

6. The final step of the electrical screening process is to identify the intended functions of the electrical commodity groups subject to AMR. The identification of electrical commodity group intended functions takes advantage of the generic component intended functions documented in NUREG-1800 and industry experience.

Electrical and I&C components that are screened in accordance with the above steps and meet the requirements of 10 CFR 54.21(a)(1)(i) and (ii) are subject to aging management review.

2.1.3 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," review of NRC Generic Safety Issues (GSIs) as part of the license renewal process is required to satisfy a finding per 10 CFR 54.29. GSIs that involve issues related to License Renewal aging management reviews or TLAAs are to be addressed in the LRA. As a result of the review of NUREG-0933, Supplement 29, dated November 2005, the following GSI evaluations are provided:

1. GSI-156.6.1, Pipe Break Effects on Systems and Components - This GSI involves assumed high energy line breaks in which the effects of the resulting pipe break prevent the operation of mitigating systems, such as the containment or safety injection systems, that are required to mitigate the effects of the break. The GSI is only indirectly related to aging of piping systems, because the probability of failure of a piping system is affected by degradation, including metal fatigue, that occurs over time. The aspects of pipe breaks that are associated with degradation are addressed in the aging management review tables associated with mechanical systems in Chapter 3.0 and in the TLAA evaluations of piping components in Chapter 4.0.

2. GSI-163, Multiple Steam Generator Tube Leakage - This GSI involves the potential loss of primary system coolant as a result of leakage through multiple steam generator tubes into an un-isolated steam generator. NRC activities to resolve the issue include continuing development of risk-informed guidance to assure compliance with existing regulatory requirements. The NRC stated that compliance with existing regulatory requirements provides reasonable assurance of plant safety. Steam generator tubes are part of the RCPB and are the subject of an aging management review and a TLAA evaluation as documented in Chapters 3.0 and 4.0. The issue of age-related degradation of steam generator tubes is being addressed within the current licensing basis of the plant and will continue to be addressed within the period of extended operation by the Steam Generator Tube Integrity Program discussed in Section B.2.9.

3. GSI-168, Environmental Qualification of Electrical Equipment - This issue has been resolved by the NRC; however, Table A.3-1 of NUREG-1800, Rev. 1, includes GSI-168 as an example of a GSI that involves a TLAA. Refer to the TLAA evaluation in LRA Section 4.4, Environmental Qualification of Electrical Equipment.

4. GSI-190, Fatigue Evaluation of Metal Components for 60-year Plant Life – This GSI addresses fatigue life of metal components and was closed by the NRC. However, the NRC concluded that license renewal applicants should address the effects of reactor coolant environment on component fatigue life. Accordingly,

the issue of environmental effects on component fatigue life is addressed in Section 4.3.

5. GSI-191, Assessment of Debris Accumulation on PWR Sump Performance – This GSI addresses the potential for blockage of containment sump strainers that filter debris from cooling water supplied to the safety injection and containment spray pumps following a postulated LOCA. The issue is based on the identification of new potential sources of debris, including failed containment coatings, that may block the sump strainers. Degradation of coatings inside containment is an issue under the CLB and is being addressed. Refer to the letter from Progress Energy (J. Scarola) to USNRC, Serial HNP-05-101: Response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," dated September 1, 2005 (ML052500530). HNP does not credit coatings to assure that the intended functions of coated SCs are maintained; thus this is not specifically a License Renewal concern. Also, the issue is not related to the 40-year term of the current operating license; and, therefore, it is not a TLAA.

2.1.4 INTERIM STAFF GUIDANCE ISSUES

The NRC staff has published on its web site additional information regarding License Renewal technical issues that are referred to as License Renewal Interim Staff Guidance Issues (LR-ISGs). These technical issues are discussed in the following paragraphs.

1. **LR-ISG-19B, Cracking of Nickel-Alloy Components in the Reactor Coolant Pressure Boundary**

   This LR-ISG is under development pending preparation of an augmented inspection program by the industry (i.e., NEI and EPRI). Guidance will be promulgated by the NRC following its review of the proposed industry program. The HNP Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is addressed in Section B.2.

2. **LR-ISG-23, Replacement Parts Necessary to Meet 10 CFR 50.48 for Fire Protection**

   The NRC staff is evaluating the need to issue an LR-ISG. No guidance has yet been promulgated.

3. **LR-ISG-2006-01, Corrosion of the Mark I Steel Containment Drywell Shell**

   The NRC staff has promulgated for public comment proposed guidance for this issue. However, the HNP containment is a large, dry PWR containment and is not of the Mark I BWR design. Therefore, this LR-ISG is not applicable to HNP.

4. **LR-ISG-2006-02, Proposed Staff Guidance on Acceptance Review for Environmental Requirements**

   The NRC staff is evaluating the need to issue an ISG. No guidance has yet been promulgated.

5. **LR-ISG-2006-03, Proposed Staff Guidance for Preparing Severe Accident Mitigation Alternatives (SAMA) Analyses**

   The NRC staff has promulgated for public comment proposed guidance for this issue. Final guidance will be issued later. The SAMA for HNP are addressed in Appendix E.

2.1.5 CONCLUSIONS

The methods described in Subsections 2.1.1 and 2.1.2 were used to identify the systems, structures, and components that are within the scope of License Renewal and the structures and components that require an aging management review. The methods are consistent with, and satisfy the requirements of, 10 CFR 54.4 and 10 CFR 54.21(a)(1).

In addition, the findings of reviews of GSIs and LR-ISGs have been reported in Subsections 2.1.3 and 2.1.4. The applicable GSIs related to aging management reviews or TLAAs have been addressed in the referenced sections of this License Renewal Application. Finally, applicable ISG-LRs have been addressed to the extent possible pending completion of ongoing NRC and industry activities.

FIGURE 2.1-1 SCOPING PROCESS FOR 10 CFR 54.4(a)(2)

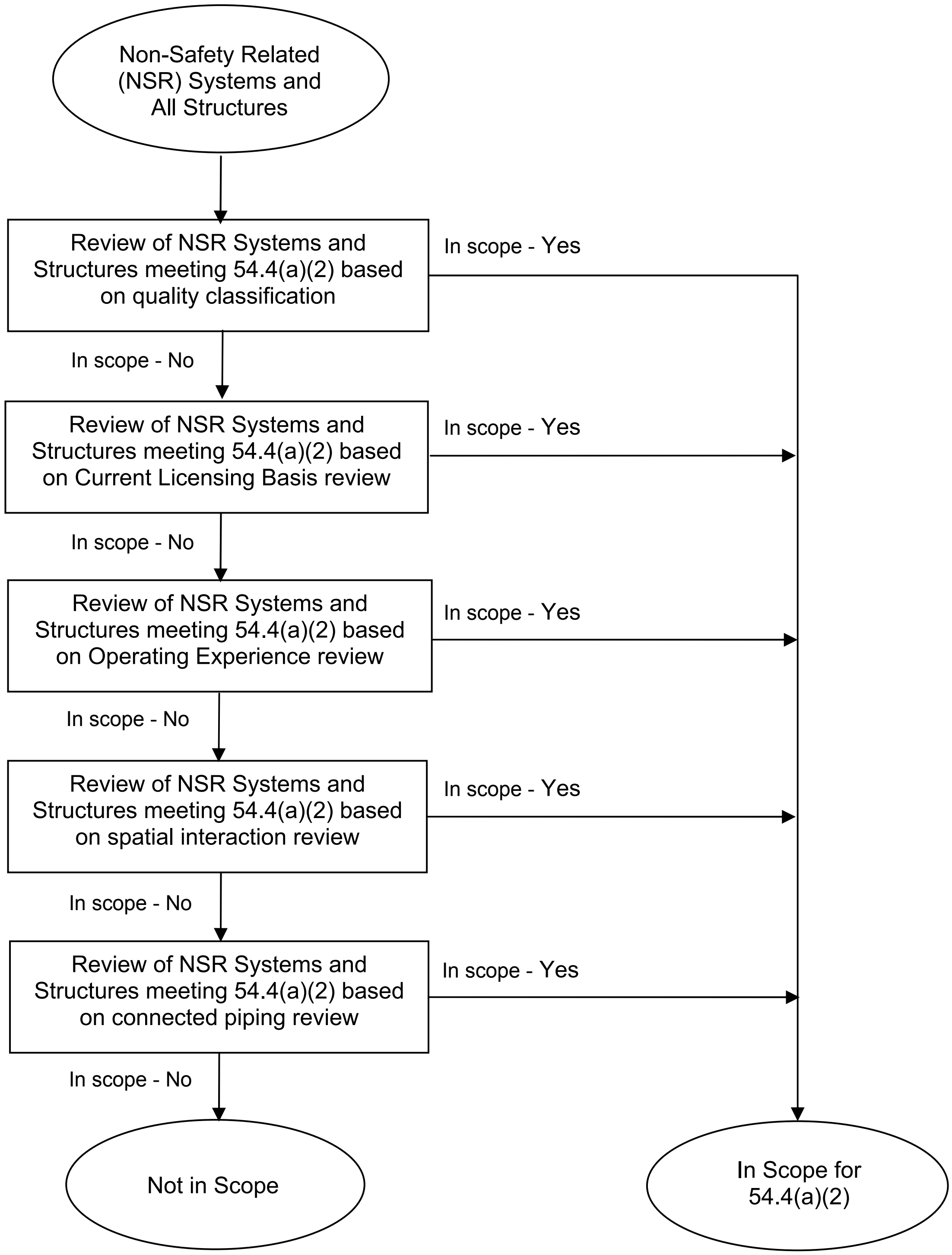
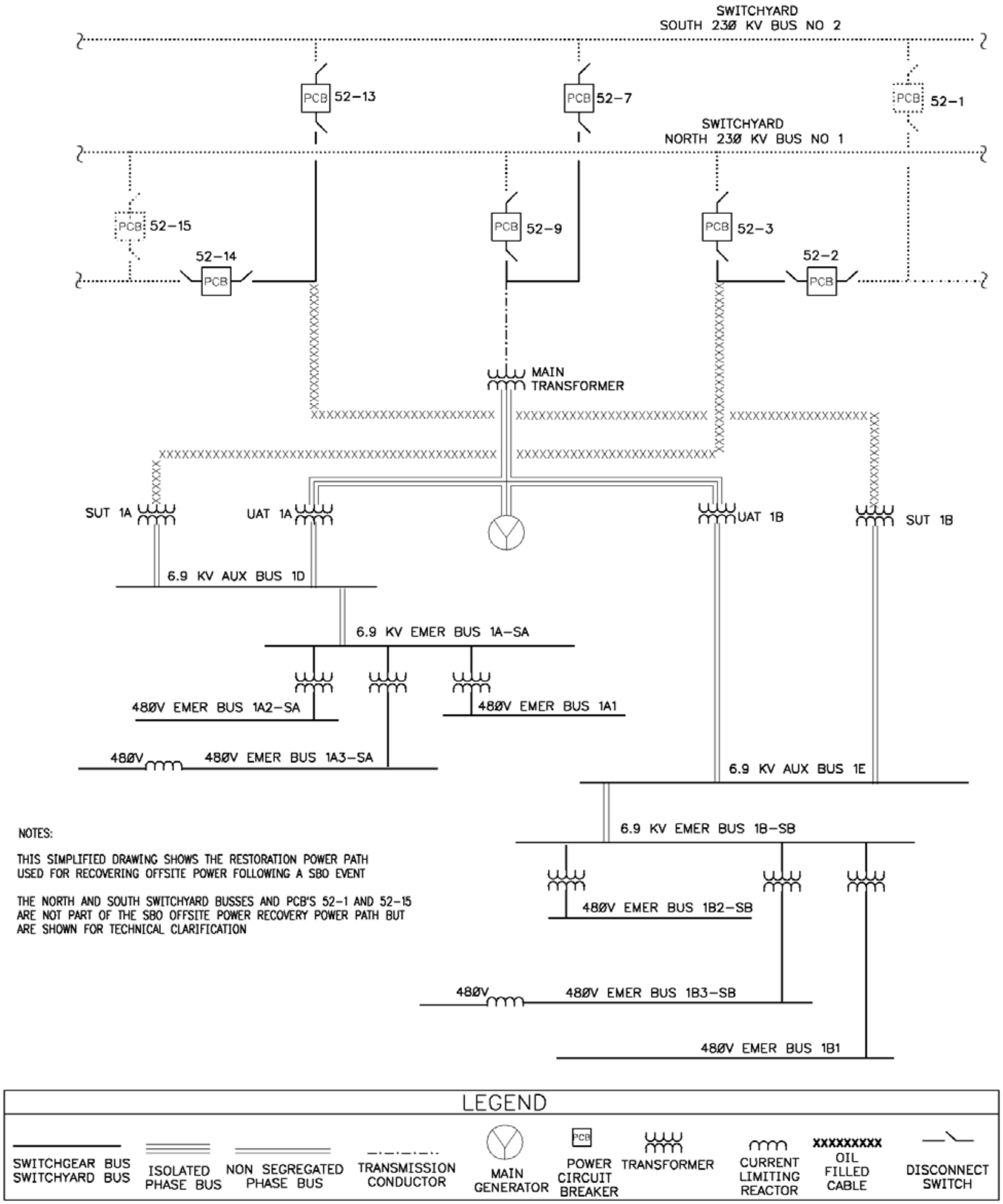


FIGURE 2.1-2 POWER PATH FOR RECOVERY OF OFFSITE POWER FOLLOWING A STATION BLACKOUT EVENT



2.2 PLANT LEVEL SCOPING RESULTS

The HNP License Renewal review methodology consists of three processes: scoping, screening, and aging management reviews. This section provides the results of application of the scoping process described in Section 2.1.1.

Tables 2.2-1, 2.2-2, and 2.2-3 provide the results of applying the License Renewal scoping criteria to mechanical systems, structures, and electrical/I&C systems. If a system or structure, in whole or in part, meets one or more of the License Renewal scoping criteria, the system or structure is considered to be within the scope of License Renewal. Also, included in the tables are references to the sections in the application that discuss screening results for in-scope systems and structures.

Figure 2.2-1 provides a layout view of HNP and identifies the major in-scope plant structures.

TABLE 2.2-1 LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Reactor Vessel and Internals	Yes	2.3.1.1
Incore Instrumentation System	Yes	2.3.1.2
Reactor Coolant System	Yes	2.3.1.3
Reactor Coolant Pump and Motor	Yes	2.3.1.4
Pressurizer	Yes	2.3.1.5
Chemical and Volume Control	Yes	2.3.3.1
Boron Thermal Regeneration System	Yes	2.3.3.2
Containment Spray System	Yes	2.3.2.1
Post Accident Hydrogen System	Yes	2.3.3.83
High Head Safety Injection System	Yes	2.3.2.3
Low Head Safety Injection / Residual Heat Removal System	Yes	2.3.2.4
Passive Safety Injection System	Yes	2.3.2.5
Primary Makeup System	Yes	2.3.3.3
Primary Sampling System	Yes	2.3.3.4
Post-Accident Sampling System	Yes	2.3.3.5
Steam Generator	Yes	2.3.1.6
Steam Generator Blowdown System	Yes	2.3.4.1
Steam Generator Chemical Addition System	Yes	2.3.4.2
Main Steam Supply System	Yes	2.3.4.3
Extraction Steam System	No	
Moisture Separator/Reheater System	No	
Steam Dump System	Yes	2.3.4.4
Auxiliary Boiler/Steam System	Yes	2.3.4.5
Feedwater System	Yes	2.3.4.6
Feedwater Heaters	No	
Feedwater Heater Drains & Vents System	Yes	2.3.4.7
Auxiliary Feedwater System	Yes	2.3.4.8
Auxiliary Steam Condensate System	Yes	2.3.4.9
Condensate System	Yes	2.3.4.10
Condensate Polishing Demineralizer	No	
Condensate Storage System	Yes	2.3.4.11
Secondary Sampling System	Yes	2.3.4.12
Steam Generator Wet Lay Up	Yes	2.3.4.13
Auxiliary Boiler Fuel Oil	No	
Condenser	No	
Condenser Vacuum System	No	
Circulating Water System	Yes	2.3.3.6
Circulating Water Treatment System	No	

TABLE 2.2-1 (continued) LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Cooling Tower System	Yes	2.3.3.7
Cooling Tower Make-Up System	Yes	2.3.3.8
Cooling Tower Blowdown System	No	
Screen Wash System	Yes	2.3.3.9
Main Reservoir Auxiliary Equipment	Yes	2.3.3.10
Auxiliary Reservoir Auxiliary Equipment	Yes	2.3.3.11
Reservoir Blowdown System	No	
Normal Service Water System	Yes	2.3.3.12
Emergency Service Water System	Yes	2.3.3.13
Component Cooling Water System	Yes	2.3.3.14
Waste Process Building Cooling Water System	Yes	2.3.3.15
Essential Services Chilled Water System	Yes	2.3.3.16
Non-Essential Services Chilled Water System	Yes	2.3.3.17
Emergency Screen Wash System	Yes	2.3.3.18
Turbine System	Yes	2.3.4.14
Digital-Electric Hydraulic System	Yes	2.3.4.15
Turbine-Generator Lube Oil System	Yes	2.3.4.16
Gland Seal and Steam Seal System	No	
Exhaust Hood Spray System	No	
Generator Gas System	Yes	2.3.3.19
Hydrogen Seal Oil System	Yes	2.3.3.20
Emergency Diesel Generator System	Yes	2.3.3.21
Diesel Generator Fuel Oil Storage and Transfer System	Yes	2.3.3.22
Diesel Generator Lubrication System	Yes	2.3.3.23
Diesel Generator Cooling Water System	Yes	2.3.3.24
Diesel Generator Air Starting System	Yes	2.3.3.25
Transformer Fire Protection System	No	
Security Power System	Yes	2.3.3.26
Training Simulator	No	
Personal Computer Data Acquisition	No	
Meteorological and Environmental Monitoring System	No	
Security Fencing and Gates	No	
Instrument Air System	Yes	2.3.3.27
Service Air System	Yes	2.3.3.28
Bulk Nitrogen Storage System	Yes	2.3.3.29
Hydrogen Gas System	Yes	2.3.3.30
Oxygen Supply System	No	

TABLE 2.2-1 (continued) LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Carbon-Dioxide Supply System	No	
Fire Protection System	Yes	2.3.3.31
Air Compressors	No	
Lube Oil Storage and Transfer System	No	
Sewage Treatment System	No	
Sewage Drains System	No	
Storm Drains System	Yes	2.3.3.32
Oily Drains System	Yes	2.3.3.33
Chemical Drains System	No	
Radioactive Floor Drains System	Yes	2.3.3.34
Radioactive Equipment Drains System	Yes	2.3.3.35
Secondary Waste System	Yes	2.3.3.36
Laundry and Hot Shower System	Yes	2.3.3.37
Upflow Filter System	Yes	2.3.3.38
Potable and Sanitary Water System	Yes	2.3.3.39
Demineralized Water System	Yes	2.3.3.40
Acid and Caustic System	No	
Filter Backwash System	Yes	2.3.3.41
Distributed I&C - Platform System	No	
Process Network System	No	
Waste Neutralization System	No	
Radiation Monitoring System	Yes	2.3.3.42
Solid Waste Processing System	No	
Oily Waste Collection and Separation System	Yes	2.3.3.43
Liquid Waste Processing System	Yes	2.3.3.44
Secondary Waste Treatment System	Yes	2.3.3.45
Boron Recycle	Yes	2.3.3.46
Gaseous Waste Processing System	Yes	2.3.3.47
Radwaste Sampling System	Yes	2.3.3.48
Refueling System	Yes	2.3.3.49
New Fuel Handling System	Yes	2.3.3.50
Spent Fuel System	Yes	2.3.3.51
Spent Fuel Pool Cooling System	Yes	2.3.3.52
Spent Fuel Pool Cleanup System	Yes	2.3.3.53
Spent Fuel Cask Decontamination and Spray System	Yes	2.3.3.54
Spent Fuel Cask	No	
Spent Resin Storage and Transfer System	Yes	2.3.3.55
Containment Auxiliary Equipment	Yes	2.3.3.56

TABLE 2.2-1 (continued) LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Contaminated Storage Building Equipment	No	
Containment Liner-Penetration Auxiliary Equipment	Yes	2.3.3.57
Security Building Equipment	No	
Security Building HVAC System	Yes	2.3.3.58
Grounds Maintenance/Landscape Equipment	No	
Monorail Hoists Equipment	Yes	2.3.3.82
Containment Vacuum Relief System	Yes	2.3.3.59
Bridge Crane Equipment	Yes	2.3.3.60
Containment Pressurization System	Yes	2.3.3.61
New Machine Shop and Storeroom Equipment	No	
Penetration Pressurization System	Yes	2.3.3.62
Chemical Storage Building Equipment	No	
Containment Cooling System	Yes	2.3.3.63
Airborne Radioactivity Removal System	Yes	2.3.3.64
Compressed Gas Storage Equipment	No	
Containment Atmosphere Purge Exhaust System	Yes	2.3.3.65
Control Rod Drive Mechanism Ventilation System	Yes	2.3.3.66
Primary Shield and Reactor Supports Cooling System	Yes	2.3.3.67
Fuel Cask Handling Crane System	Yes	2.3.3.68
Turbine Deck Metal Storage Building Equipment	No	
Reactor Auxiliary Building Ventilation System	Yes	2.3.3.69
Control Room Area Ventilation System	Yes	2.3.2.6
Emergency Service Water Intake Structure Ventilation System	Yes	2.3.3.70
HVAC Service Building	No	
HVAC Operations Building	No	
Turbine Building Area Ventilation System	Yes	2.3.3.71
Waste Processing Building HVAC System	Yes	2.3.3.72
Microwave Building Equipment	No	
Operation Office Equipment	No	
Administrative Building Equipment	No	
HVAC Administrative Building	No	
Reactor Auxiliary Building Equipment	No	
Common Building Equipment	No	
Diesel Generator Building Equipment	No	
Diesel Fuel Oil Storage Tank Building Equipment	No	
Diesel Generator Building Ventilation System	Yes	2.3.3.73
Fuel Oil Transfer Pump House Ventilation System	Yes	2.3.3.74
Fuel Handling Building Auxiliary Equipment	Yes	2.3.3.75

TABLE 2.2-1 (continued) LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Fuel Handling Building HVAC System	Yes	2.3.3.76
Service Building Equipment	No	
Turbine Building Equipment	No	
Turbine Building Health Physics Room Auxiliary Equipment	Yes	2.3.3.77
Lunchroom Equipment	No	
Warehouses Equipment	No	
Waste Processing Building Equipment	No	
Water Treatment Building Equipment	No	
Hydrogen Storage	No	
Oil & Paint Storage Building Equipment	No	
Polar Crane Auxiliary Equipment	Yes	2.3.3.78
Turbine-Generator Gantry Crane Equipment	No	
Turbine Generator Maintenance Canopy	No	
Chlorine Building & Shed Equipment	No	
Elevator System	Yes	2.3.3.79
Site Roads and Parking Lots Equipment	No	
Site Railroad Spurs Equipment	No	
Tool Rooms and Outside Storage Equipment	No	
Plant Dam (Main Dam) Equipment	No	
Paint Shop and Storage Building Equipment	No	
Stores Receiving Building Equipment	No	
Mobile Equipment Shop Equipment	No	
Fire House Equipment	No	
Hot Machine Shop Equipment	No	
Technical Support Center HVAC System	Yes	2.3.3.80
Training Area Equipment	No	
Emergency Off-Site Facility Equipment	No	
Harris E & E Center Equipment	No	
Nuclear Plant Construction and Engineering Department (NPCD/NPED) Offices Equipment	No	
Tank Area/Building Equipment	No	
Non-Equipment Systems	No	
Health Physics Equipment	No	
Site Personal Computers	No	
Site Local Area Network (LAN)	No	
Information Management Communications Devices	No	
Video Information System	No	
Radiochemistry Equipment	No	

TABLE 2.2-1 (continued) LICENSE RENEWAL SCOPING RESULTS FOR MECHANICAL SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Safety Equipment	No	
Plant Vehicles	No	
General Instrumentation and Control Spares	No	
General Environmental Qualification	No	
General Mechanical Spares	No	
Lab Equipment	No	
Instrumentation & Control Test Equipment	No	
Preventive Maintenance Validation Information	No	
Insulation Shop Equipment	No	
Hot Machine Shop Equipment	No	
Piping (includes Piping Analysis) (contains no components)	No	
Analysis Software	No	

TABLE 2.2-2 LICENSE RENEWAL SCOPING RESULTS FOR STRUCTURES

Structure Name	Structure in License Renewal Scope	Screening Results Application Subsection
Reactor Auxiliary Building	Yes	2.4.2.1
Auxiliary Boiler	No	Note 1
Administration Building	No	Note 1
Auxiliary Reservoir Channel	Yes	2.4.2.2
Auxiliary Dam and Spillway	Yes	2.4.2.3
Auxiliary Reservoir	Yes	2.4.2.4
Auxiliary Reservoir Separating Dike	Yes	2.4.2.5
Containment Structure	Yes	2.4.1.1
Containment Internal Structures	Yes	2.4.1.2
Chemical Storage Building	No	Notes 1, 2
Cooling Tower	Yes	2.4.2.6
Cooling Tower Makeup Water Intake Channel	Yes	2.4.2.7
Circulating Water Intake Structure	Yes	2.4.2.8
Diesel Generator Building	Yes	2.4.2.9
Main Dam and Spillway	Yes	2.4.2.10
Diesel Fuel Oil Storage Tank Building	Yes	2.4.2.11
Emergency Service Water and Cooling Tower Makeup Intake Structure	Yes	2.4.2.12
Emergency Service Water Discharge Channel	Yes	2.4.2.13
Emergency Service Water Discharge Structure	Yes	2.4.2.14
Emergency Service Water Intake Channel	Yes	2.4.2.15
Fuel Handling Building	Yes	2.4.2.16
Harris E & E Center	No	Note 1
HVAC Equipment Room	Yes	2.4.2.17
In-Processing Building	No	Notes 1, 2
Mobile Equipment Shop	No	Notes 1, 2
Meteorological Tower	No	Note 1
Microwave Tower and Equipment House	No	Note 1
Miscellaneous Structures	No	Notes 1, 2, 3
Operations Office	No	Notes 1, 2
Outside the Power Block Structures	Yes	2.4.2.18
Paint Shop and Storage Building	No	Notes 1, 2
Main Reservoir	Yes	2.4.2.19
Service Building	No	Notes 1, 2
Security Building	Yes	2.4.2.20
Old Steam Generator Storage Facility	No	Note 1
Emergency Service Water Screening Structure	Yes	2.4.2.21
Sewage Treatment Building	No	Note 1
Normal Service Water Intake Structure	Yes	2.4.2.22
Switchyard Relay Building	Yes	2.4.2.23

TABLE 2.2-2 (continued) LICENSE RENEWAL SCOPING RESULTS FOR STRUCTURES

Structure Name	Structure in License Renewal Scope	Screening Results Application Subsection
Transformer and Switchyard Structures	Yes	2.4.2.24
Turbine Building	Yes	2.4.2.25
Tank Area/Building	Yes	2.4.2.26
Waste Processing Building	Yes	2.4.2.27
Bulk Storage Warehouse	No	Notes 1, 2
Water Treatment Building	No	Notes 1, 2
Yard Structures	Yes	2.4.2.28
Contaminated Storage Building	No	Note 1
Site Roads and Parking Lots	No	
Site Railroad Spurs	No	
Tool Room #3 and Outside Storage	No	Note 1

Notes:

1. This structure is not a Class I structure and supports no safety related functions. There are no license renewal SSCs supported by the structure. In addition, the collapse of any non-Seismic Category I structures such as this structure will not impair the integrity of any Seismic Category I structures or components because either sufficient distance is maintained between structures or the partial or complete collapse of these structures will not impair the integrity of any neighboring Seismic Category I structures or components. Therefore, this structure performs no License Renewal intended functions and is not in the scope of license renewal.

2. This structure contains fire protection equipment; however, neither the structure nor the equipment supports a fire protection intended function for License Renewal.

3. Includes the Acid and Caustic Tanks & Pumps Area and Support Structure, Gas Storage Area, Aux Boiler Fuel Oil Storage Tank and Unloading Dike Areas, Settling Basin, Waste Neutralization Basin, Warehouses 6 and 9, Construction QA Vault, Chlorine Building and Shed, Hydrogen Oily Water Drain Tank Support Structure, CT Blowdown System Structures, CT Makeup Strainer Pit and Valve & Vent Station Foundation, Normal Service Water Miscellaneous Structures, Fiber Optics Panel Support Pad, Turbine Build North Transformer Slab and Shed, 1SW-301 Valve Pit, Unit 2 RAB and Containment Paving Slabs, Unit 3 and 4 Containment Paving Slabs)

TABLE 2.2-3 LICENSE RENEWAL SCOPING RESULTS FOR ELECTRICAL/I&C SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
230KV Switchyard	Yes	2.5, 2.3.3.81
Excore Nuclear Instrument	Yes	2.5
Reactivity Computer System	No	
Rod Control System	Yes	2.5
Rod Position Indication System	No	
Reactor Protection System/Engineered Safety Features Actuation System	Yes	2.5
Engineered Safety Features Actuation System	No	Note 3
Metal Impact Monitoring	No	
NSSS Process Instrumentation	Yes	2.5
Reactor Coolant Pump Vibration	Yes	2.5
Gross Failed Fuel Detection	Yes	2.5, 2.3.3.81
Generator System	Yes	Note 1
Generator Exciter System	Yes	Note 1
Generator Isolated Phase Bus System	Yes	2.5
Load Frequency Control	No	
Emergency Safeguards Sequencer	Yes	2.5
Main Transformer	Yes	2.5
Startup and Auxiliary Transformer	Yes	2.5
6.9KV AC Distribution System	Yes	2.5
480 Volt AC Distribution System	Yes	2.5
208/120 Volt AC Distribution System	Yes	2.5
Uninterruptible AC System	Yes	2.5
Uninterruptible AC – Class 1E System	Yes	2.5
Normal AC Lighting System	Yes	Note 1
Emergency AC Lighting System	Yes	2.5
Emergency DC Lighting System	Yes	2.5
250 Volt DC Distribution System	Yes	2.5
125 Volt DC Distribution – Class 1E System	Yes	2.5
125 Volt DC Distribution – Non Class 1E System	Yes	2.5
Lightning Protection System	Yes	2.5
Cathodic Protection System	No	
Site Cables System	Yes	Note 2
Site Grounding System	Yes	2.5
Heat Tracing System	Yes	2.5
Process Computer	Yes	2.5
BOP Process Instrumentation	Yes	2.5
Main Control Board	Yes	Note 2
Auxiliary Equipment and Recorder Panel	Yes	Note 2
Main Termination Cabinets	Yes	Note 2

TABLE 2.2-3 (continued) LICENSE RENEWAL SCOPING RESULTS FOR ELECTRICAL/I&C SYSTEMS

System Name	System in License Renewal Scope	Screening Results Application Subsection
Main Control Board-Auxiliary Control Panel Transfer Panels	Yes	2.5
Annunciator System	Yes	2.5
Isolation Cabinets	Yes	Note 2
Auxiliary Relay Cabinets	Yes	Note 2
Auxiliary Control Panel	Yes	Note 2
Public Address System	Yes	2.5
Public Address System – Outside Power Block	No	
Private Automatic Branch Exchange (PABX) Phone System	No	
Sound Powered Telephone	Yes	2.5
Emergency Communications	No	
FCC Licensed Portable Radios	Yes	2.5
NC State Radio	No	
Seismic Monitoring System	Yes	2.5
Security Computer System	No	
Access Control System	No	
Closed Circuit Television System	No	
Intrusion Devices	No	
Security Lighting	Yes	2.5
Physical Search System	No	
Security Communication System	Yes	2.5
Site Fire Detection System	Yes	2.5
Waste Process Computer	No	
Waste Processing Control Board	No	
Waste Processing Annunciators	Yes	2.5
Waste Processing Analog Control	No	

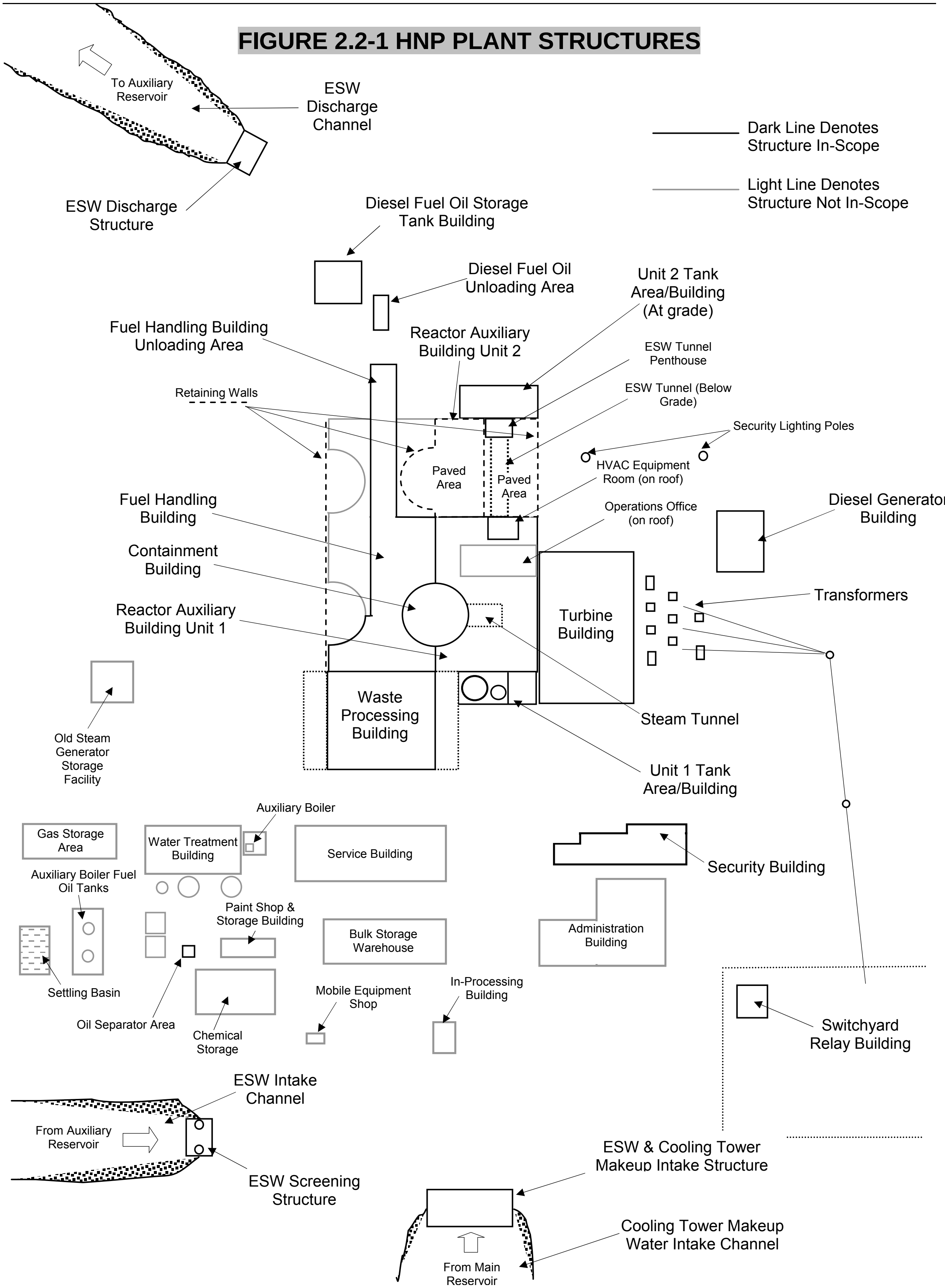
Notes:

1. This system contains non-safety related electrical components mounted near safety related equipment. The supports for such components are considered to be civil/structural commodities. Scoping and screening of civil/structural commodities are addressed in Section 2.4.

2. The system consists of civil/structural components and commodities, such as electrical enclosures and conduit, used to support electrical components or commodities assigned to other systems. Scoping and screening of civil components and commodities are addressed in Section 2.4.

3. In the HNP Equipment Database, this system contains no components; its components have been incorporated into the Reactor Protection System.

FIGURE 2.2-1 HNP PLANT STRUCTURES



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2.3 SCOPING AND SCREENING RESULTS – MECHANICAL SYSTEMS

The determination of mechanical systems within the scope of License Renewal is made through the application of the process described in Section 2.1. The results of the mechanical systems scoping review are contained in Section 2.2.

Section 2.1 also provides the methodology for determining the components within the scope of 10 CFR 54.4 that meet the requirements contained in 10 CFR 54.21(a)(1). The components that meet these screening requirements are identified in this section. These identified components consequently require an aging management review for License Renewal.

The screening results for mechanical systems consist of lists of components and commodities that require aging management review and their intended functions. Brief descriptions of mechanical systems within the scope of License Renewal are provided as background information, and mechanical system intended functions are described for in-scope systems.

The screening results are provided below in four subsections:

- Reactor Vessel, Internals, and Reactor Coolant System,
- Engineered Safety Features Systems,
- Auxiliary Systems, and
- Steam and Power Conversion Systems.

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

The Reactor Vessel, Internals, and Reactor Coolant System consist of the systems and components designed to contain and support the nuclear fuel, contain the reactor coolant, and transfer the heat produced in the reactor to the steam and power conversion systems for the production of electricity.

The HNP Reactor Coolant System (RCS) consists of three similar heat transfer loops connected in parallel to the reactor pressure vessel. Each loop contains a reactor coolant pump, steam generator and associated piping and valves. In addition, the system includes a pressurizer, pressurizer relief and safety valves, interconnecting piping and instrumentation necessary for operational control. All the above components are located in the Containment Building.

During operation, the RCS transfers the heat generated in the core to the steam generators where steam is produced to drive the turbine generator. Borated demineralized water is circulated in the RCS at a flow rate and temperature consistent with achieving the reactor core thermal-hydraulic performance. The water also acts as a neutron moderator and reflector, and as a solvent for the neutron absorber (boron) used in chemical shim reactivity control. The RCS pressure boundary provides a barrier against the release of radioactivity generated within the reactor, and is designed to ensure a high degree of integrity throughout the life of the plant.

The following systems are included in this Subsection:

1. Reactor Vessel and Internals (Subsection 2.3.1.1)

2. Incore Instrumentation System (Subsection 2.3.1.2)

3. Reactor Coolant System (Subsection 2.3.1.3)

4. Reactor Coolant Pump and Motor (Subsection 2.3.1.4)

5. Pressurizer (Subsection 2.3.1.5)

6. Steam Generator (Subsection 2.3.1.6)

2.3.1.1 Reactor Vessel and Internals

System Description

Reactor Vessel

The Reactor Vessel (RV) is an integral part of the RCS and is capable of accommodating the temperatures and pressures associated with RCS operational transients. The RV contains and supports the RV Internals which include the reactor core, core support structures, control rods, and other parts directly associated with the core. The RV is one of the major components within the Reactor Coolant Pressure Boundary (RCPB).

The RV is a vertical, cylindrical pressure vessel with a welded hemispherical bottom head and a removable, bolted, flanged and gasketed, hemispherical upper head. The RV is fabricated from carbon steel. Internal surfaces of the vessel which are in contact with primary coolant are weld overlaid with 0.125 inch (in.) minimum of stainless steel or inconel. The RV has inlet and outlet nozzles located in a horizontal plane just below the RV flange but above the top of the core. Coolant enters the vessel through the inlet nozzles and flows down the core barrel-vessel wall annulus, turns at the bottom and flows up through the core to the outlet nozzles.

The reactor vessel closure head contains head adaptors. These head adaptors are tubular members, attached by partial penetration welds to the underside of the closure head. The upper ends of these adaptors contain acme threads for the assembly of control rod drive mechanisms or instrumentation adaptors. The bottom head of the vessel contains penetration nozzles for entry of the incore nuclear instrumentation.

Each bottom nozzle consists of a tubular member made of either an inconel or an inconel-stainless steel composite tube. Each tube is attached to the inside of the bottom head by a partial penetration weld.

The RV flange and head are sealed by two hollow metallic O-rings. Seal leakage is detected by means of two leakoff connections: one between the inner and outer rings and one outside the outer O-ring. The O-rings are replaced at each refueling outage; therefore, they are not required to have an aging management review.

Design and fabrication of the RV was carried out in accordance with ASME Code, Section III, Class 1 requirements in effect prior to the issuance of 10 CFR Part 50, Appendix G. The RV closure studs, nuts, and washers are designed and fabricated in accordance with the requirements of the ASME Code, Section III.

The Incore Nuclear Instrument System thimble guide tubes are essentially extensions of the RV. The guide tubes extend from the bottom of the RV down through the concrete shield area and up to a thimble seal table. The guide tubes and seal table are included within the RV and Internals System. The annular region between the Incore Instrumentation System flux thimbles and the thimble guide tubes from the RV to the flux thimble seal table is in contact with reactor coolant, and these components are part of the RCPB.

The exterior of the RV is insulated with two types of insulation. The majority of the insulation is canned stainless steel reflective sheets that are a minimum of three inches (in.) thick and contoured to match the vessel geometry. In the highest neutron leakage portion of the vessel, a high efficiency, high temperature insulation bonded to a layer of neutron attenuation material of varying thickness is used. All of the insulation and insulation/shielding modules are removable but the access to the insulation/shielding is limited by the surrounding concrete.

Reactor Internals

The components of the Reactor Vessel Internals (RVI) are divided into three parts consisting of the lower core support structure, the upper core support structure and the incore instrumentation support structure. The RVI support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and control rod drive mechanisms, direct reactor coolant flow past the fuel elements, direct reactor coolant flow to the pressure vessel head, provide gamma and neutron shielding, and guides for the incore instrumentation.

The major support member of the RVI is the lower core support structure. This support structure assembly consists of the core barrel, the core baffle, the lower core plate and support columns, the neutron shield pads, and the core support which is welded to the core barrel. All the major material for this structure is Type 304 stainless steel. The lower core support structure is supported at its upper flange from a ledge in the RV head flange and its lower end is restrained in its transverse movement by a radial support system attached to the vessel wall. Within the core barrel are an axial baffle and a lower core plate, both of which are attached to the core barrel wall and form the enclosure periphery of the assembled core. The lower core support structure and principally the core barrel serve to provide passageways and control for the reactor coolant flow. The lower core plate is positioned at the bottom level of the core below the baffle plates and provides support and orientation for the fuel assemblies. The lower core plate is a member through which the necessary flow distribution holes for each fuel assembly are machined. Fuel assembly locating pins (two for each assembly) are also inserted into this plate. Columns are placed between this plate and the 16 in. thick core support casting which forms the bottom of the core barrel in order to provide stiffness and to transmit the core load to the core support.

The neutron shield pad assembly consists of four pads that are bolted and pinned to the outside of the core barrel. These pads are constructed of Type 304 stainless steel. Specimen guides in which RV material surveillance samples can be inserted and irradiated during reactor operation are attached to the pads. Transverse loads of the fuel assemblies are transmitted to the core barrel shell by direct connection of the lower core plate to the barrel wall and by upper core plate alignment pins which are welded into the core barrel. The main radial support system of the lower end of the core barrel is accomplished by "key" and "keyway" joints to the RV wall. At equally spaced points around the circumference, an inconel clevis block is welded to the vessel inner diameter. Another inconel insert block is bolted to each of these blocks and has a "keyway" geometry. Opposite each of these is a "key" which is attached to the internals. At assembly, as the internals are lowered into the vessel, the keys engage the keyways in the axial direction. In the event of an abnormal downward vertical displacement of the internals following a hypothetical failure, energy absorbing devices limit the displacement after contacting the vessel bottom head. The load is then transferred through the energy absorbing devices of the internals to the vessel. The energy absorbers, cylindrical in shape, are contoured on their bottom surface to the RV bottom head geometry. Assuming a downward vertical displacement the potential energy of the system is absorbed mostly by the strain energy of the energy absorbing devices.

The upper core support assembly consists of the upper support plate assembly, and the upper core plate between which are contained support columns and guide tube assemblies. The support columns establish the spacing between the upper support plate assembly and the upper core plate and are fastened at top and bottom to these plates. The support columns transmit the mechanical loadings between the two plates and serve the supplementary function of supporting thermocouple guide tubes. The guide tube assemblies, sheath and guide the control rod drive shafts and control rods. They are fastened to the upper support plate and are restrained by pins in the upper core plate for proper orientation and support. The upper core support assembly is positioned in its proper orientation with respect to the lower support structure by flat-sided pins pressed into the core barrel which in turn engage in slots in the upper core plate. As the upper support structure is lowered into the lower internals, the slots in the plate engage the flat-sided pins in the axial direction. Lateral displacement of the plate and of the upper support assembly is restricted by this design. Fuel assembly locating pins protrude from the bottom of the upper core plate and engage the fuel assemblies as the upper assembly is lowered into place. Proper alignment of the lower core support structure, the upper core support assembly, the fuel assemblies and control rods is thereby assured by this system of locating pins and guidance arrangement. The upper core support assembly is restrained from any axial movements by a large circumferential spring which rests between the upper barrel flange and the upper core support assembly and is compressed by the RV head flange.

The incore instrumentation support structures consist of an upper system to convey and support thermocouples penetrating the vessel through the head and a lower system to convey and support flux thimbles penetrating the vessel through the bottom. The upper system utilizes the RV head penetrations. The thermocouple conduits are supported from the columns of the upper core support system. The thermocouple conduits are sealed stainless steel tubes. In addition to the upper incore instrumentation, there are RV bottom port columns which carry the retractable, cold worked stainless steel flux thimbles that are pushed upward into the reactor core.

The Control Rod Drive Mechanism (CRDM) shafts and pressure housings and the Rod Cluster Control Assemblies (RCCA) are included within the RV and Internals System. The RCCA's are attached to the CRDM shaft which allows the RCCA's to be inserted or withdrawn for reactivity control.

The RV and Internals System includes components required for the RV Level Indicating System (RVLIS). RVLIS instrumentation has a Regulatory Guide (RG) 1.97, Category 1, Post-Accident Monitoring function for monitoring reactor coolant inventory. RVLIS includes capillary tubing and other components required to support the containment isolation pressure boundary function.

The RV and Internals System meets the scoping criteria for fire protection, Environmental Qualification (EQ), and Pressurized Thermal Shock (PTS).

The RV and Internals System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the RV and Internals System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Support and protection of the reactor core and internals components, • Directing coolant flow to adequately remove heat from the core, • Providing reactivity control through support of the RCCAs and distribution of borated coolant, • Contains components that support the containment isolation function, • Support of post accident monitoring, and • Providing a portion of the RCPB.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and PTS.

The RV and Internals System is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components that are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and pressurized thermal shock events, and

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Reactor Vessel and Internals components are discussed further in FSAR Sections 3.9.5, 4.5, 5.1, 5.2, 5.3, and 7.7.1.9. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Reactor Vessel and Internals are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0800-LR 5-G-0801-LR 5-G-0844-LR

Components Subject to Aging Management Review

The table below identifies the Reactor Vessel and Internals components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation - Reactor Vessel and Internals.

TABLE 2.3.1-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR VESSEL AND INTERNALS

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Reactor Vessel; Closure Head Dome	M-1 Pressure Boundary
Reactor Vessel; Closure Head Flange	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; Closure Head Stud Assembly	M-1 Pressure Boundary
Reactor Vessel; Vessel Flange Leak Detection Line	M-1 Pressure Boundary
Reactor Vessel; CRDM Head Penetration Nozzle	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; CRDM Head Penetration Flange	M-1 Pressure-Boundary M-4 Structural Support
CRDM Latch Housings	M-1 Pressure-Boundary M-4 Structural Support
CRDM Rod Travel Housings	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; CRDM Head Penetration Thermal Sleeves	M-6 Thermal Insulation
Reactor Vessel; Head Adapter Plug	M-1 Pressure Boundary
Reactor Vessel; Head Lifting Lugs	M-4 Structural Support
Reactor Vessel; Ventilation Shroud Support Ring	M-4 Structural Support
Reactor Vessel; Seal Assembly Retaining Clamps and Closure Bolting	M-1 Pressure-Boundary
Reactor Vessel; Seal Assemblies (Core Exit Thermocouples)	M-1 Pressure Boundary
Reactor Vessel; Primary Nozzles	M-1 Pressure-Boundary
Reactor Vessel; Primary Nozzle Support Pads	M-4 Structural Support
Reactor Vessel; Primary Nozzle Safe Ends	M-1 Pressure Boundary
Reactor Vessel; Primary Nozzle Welds	M-1 Pressure Boundary
Reactor Vessel; Upper Shell	M-1 Pressure Boundary
Reactor Vessel; Intermediate Shell	M-1 Pressure Boundary
Reactor Vessel; Lower Shell	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; Beltline Welds	M-1 Pressure Boundary
Reactor Vessel; Vessel Flange and Core Support Ledge	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; Bottom Head (Dome and Torus)	M-1 Pressure Boundary
Reactor Vessel; Core Support Pads (Clevis)	M-4 Structural Support
Reactor Vessel; Instrument Tubes (Bottom Head)	M-1 Pressure-Boundary M-4 Structural Support
Reactor Vessel; Head Vent Pipe (Top Head)	M-1 Pressure Boundary
Upper Internals; Upper Support Plate	M-10 Control Rod Support

TABLE 2.3.1-1 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR VESSEL AND INTERNALS

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Upper Internals; Upper Support Column	M-10 Control Rod Support M-12 Incore Instrumentation Support
Upper Internals; Upper Support Column Bolts	M-10 Control Rod Support M-12 Incore Instrumentation Support
Upper Internals; Upper Support Column Spider	M-10 Control Rod Support M-12 Incore Instrumentation Support
Upper Internals; Upper Core Plate	M-9 Core Support M-11 Core Flow Distribution
Upper Internals; Fuel Alignment Pins	M-9 Core Support
Upper Internals; Hold-down Spring	M-9 Core Support M-10 Control Rod Support
Upper Internals; RCCA Guide Tubes	M-10 Control Rod Support
Upper Internals; RCCA Guide Tube Bolts	M-10 Control Rod Support
Upper Internals; RCCA Guide Tube Support Pins (split pins)	M-10 Control Rod Support
Upper Internals; Head and Vessel Alignment Pins	M-10 Control Rod Support
Upper Internals; Head Cooling Spray Nozzles	M-11 Core Flow Distribution
Upper Internals; Upper Core Plate Alignment Pins	M-10 Control Rod Support
Upper Internals; Upper Instrumentation Column, Conduit, and Supports	M-12 Incore Instrumentation Support
Lower Internals; Core Barrel	M-9 Core Support M-11 Core Flow Distribution M-14 Reactor Vessel Shielding
Lower Internals; Core Barrel Flange	M-9 Core Support M-11 Core Flow Distribution M-14 Reactor Vessel Shielding
Lower Internals; Core Barrel Outlet Nozzles	M-11 Core Flow Distribution
Lower Internals; Thermal Shield	M-14 Reactor Vessel Shielding
Lower Internals; Baffle and Former Plates	M-9 Core Support M-11 Core Flow Distribution M-14 Reactor Vessel Shielding
Lower Internals; Baffle/Former Bolts	M-9 Core Support
Lower Internals; Lower Core Plate	M-9 Core Support M-11 Core Flow Distribution M-12 Incore Instrumentation Support M-13 Secondary Core Support
Lower Internals; Fuel Alignment Pins	M-9 Core Support
Lower Internals; Lower Support Forging	M-9 Core Support M-11 Core Flow Distribution M-12 Incore Instrumentation Support M-13 Secondary Core Support

TABLE 2.3.1-1 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR VESSEL AND INTERNALS

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Lower Internals; Lower Support Plate Columns	M-9 Core Support M-12 Incore Instrumentation Support M-13 Secondary Core Support
Lower Internals; BMI Columns	M-12 Incore Instrumentation Support
Lower Internals; BMI Column Cruciforms	M-12 Incore Instrumentation Support
Lower Internals; Lower Support Plate Column Bolts	M-9 Core Support M-11 Core Flow Distribution M-12 Incore Instrumentation Support M-13 Secondary Core Support
Lower Internals; Radial Support Keys	M-9 Core Support
Lower Internals; Radial Support Key Bolts	M-9 Core Support
Lower Internals; Clevis Inserts	M-9 Core Support
Lower Internals; Clevis Insert Bolts	M-9 Core Support
Lower Internals; Tie Plate (Upper and Lower)	M-11 Core Flow Distribution M-12 Incore Instrumentation Support M-13 Secondary Core Support
Lower Internals; Diffuser Plate	M-11 Core Flow Distribution
Lower Internals; Secondary Core Support	M-9 Core Support M-11 Core Flow Distribution M-12 Incore Instrumentation Support M-13 Secondary Core Support
Lower Internals; Irradiation Specimen Guide	M-4 Structural Support
Lower Internals; Specimen Plugs	M-4 Structural Support
Flux Thimble Guide Tubes	M-1 Pressure Boundary M-4 Structural Support
Flux Thimble Seals	M-1 Pressure Boundary
Closure bolting	M-1 Pressure Boundary
Containment Isolation Piping and Components	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
Solenoid Valves	M-1 Pressure Boundary

2.3.1.2 Incore Instrumentation System

System Description

The Incore Instrumentation System is composed of thermocouples, positioned to measure fuel assembly coolant outlet temperatures at preselected positions, and fission chamber detectors that can be positioned in guide thimbles which run the length of selected fuel assemblies to measure the neutron flux distribution. The incore instrumentation is provided to obtain data from which fission power density distribution in the core, reactor coolant enthalpy distribution in the core, and fuel burnup distribution may be determined.

Instrumentation is located in the core so that movable neutron detectors and fixed thermocouples provide radial, axial, and azimuthal core characteristics for all core quadrants. The Incore Instrumentation System consists of chromel-alumel thermocouples at fixed core outlet positions and movable miniature neutron detectors which can be positioned at the center of selected fuel assemblies, anywhere along the length of the fuel assembly vertical axis.

The chromel-alumel thermocouples are threaded into guide tubes that penetrate the reactor vessel head through seal assemblies, and terminate at the exit flow end of the fuel assemblies. The thermocouples are provided with two primary seals, a conoseal and Grafoil seal from conduit to head. Thermocouple readings are monitored by one or more of the plant computer systems.

Miniature fission chamber detectors can be remotely positioned in retractable guide thimbles to provide flux-mapping of the core. The stainless steel detector shell is welded to the leading end of a helical wrap drive cable and to a stainless steel sheathed coaxial cable. The retractable thimbles, into which the miniature detectors are driven, are pushed into the reactor core through the Thimble Guide Tubes. Their distribution over the core is nearly uniform with about the same number of thimbles located in each quadrant. The thimbles are closed at the leading ends, are dry inside, and serve as the pressure barrier between the reactor water pressure and the atmosphere.

The drive system for the insertion of the miniature detectors consists basically of drive assemblies, 5-path transfer assemblies, and 10-path transfer assemblies. The drive system pushes hollow helical wrap drive cables into the core with the miniature detectors attached to the leading ends of the cables and small diameter sheathed coaxial cables threaded through the hollow end back to the ends of the drive cables.

The Incore Instrumentation System includes instrumentation and controls (I&C) components required for the RVLIS. RVLIS and incore exit thermocouples provide information utilized to give the operator an advance warning of the approach to Inadequate Core Cooling (ICC) and to monitor the recovery from ICC. The RVLIS instrumentation is not required to prevent or mitigate the consequences of an accident; however, it provides an important post-accident monitoring function.

The Incore Instrumentation System includes components needed for RG 1.97, Category 1 monitoring requirements (i.e., Core Exit Thermocouple temperature).

The Incore Instrumentation System includes components such as flux thimbles and seal assemblies required to maintain the RCS pressure boundary.

The Incore Instrumentation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Incore Instrumentation System meets the scoping criteria for fire protection (10 CFR 50.48), and EQ (10 CFR 50.49).

Based on the above discussion, the Incore Instrumentation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Support of post accident monitoring, and • Providing a portion of the RCPB.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The Incore Instrumentation System is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

3. Components that are relied on during postulated fires, and

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Incore Instrumentation System is described in FSAR Sections 4.4.4 and 7.7.1.9.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

There are no License Renewal scoping drawings that depict the Incore Instrumentation System.

Components Subject to Aging Management Review

The table below identifies the Incore Instrumentation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation – Incore Instrumentation System.

TABLE 2.3.1-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INCORE INSTRUMENTATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Flux Thimble Tubes	M-1 Pressure-Boundary
Flux Thimble Isolation Valves	M-1 Pressure-Boundary

2.3.1.3 Reactor Coolant System

System Description

The Reactor Coolant System (RCS) includes piping and components not otherwise included in the RV and Internals, Incore Instrumentation, Reactor Coolant Pump (RCP), Pressurizer, or Steam Generator (SG) Systems. The RCS consists of three similar heat transfer loops connected in parallel to the RV. Each loop contains a RCP, SG, and associated piping and valves. In addition, the system includes interconnecting piping and components associated with the Pressurizer, pressurizer relief and safety valves, and the Pressurizer Relief Tank (PRT).

During operation, the RCS transfers the heat generated in the reactor core to the SGs where steam is produced to drive the turbine generator. The RCS pressure boundary provides a barrier against the release of radioactivity generated within the reactor, and is designed to ensure a high degree of integrity throughout the life of the plant. RCS pressure is controlled by the use of the pressurizer where water and steam are maintained in equilibrium by electrical heaters and water sprays. Steam can be formed (by the heaters) or condensed (by the Pressurizer spray) to minimize pressure variations due to contraction and expansion of the reactor coolant. Spring loaded safety valves and power operated relief valves are connected to the discharge lines from the Pressurizer to the PRT, where discharged steam is condensed and cooled by mixing with water. The PRT is included in the Pressurizer system.

The RCS includes Safety Class 1, Safety Class 2, and non nuclear safety piping designed and fabricated in accordance with ASME Code, Section III, Class 1, Class 2, and ANSI B 31.1 requirements. RCS piping is designed and fabricated to accommodate the system pressures and temperatures attained under all expected modes of plant operation. In general, the reactor coolant piping and fittings are constructed of austenitic stainless steel. The main loop piping is fabricated from forged pipe and cast fittings; the remaining RCS piping is fabricated from forged pipe and forged fittings. Smaller RCS piping, such as the pressurizer surge line, spray lines, safety and relief valve piping, loop drains, and connecting lines to other systems are also austenitic stainless steel. Joints and connections are welded, except for the pressurizer code safety valves, where flanged joints are used.

RCS piping includes the interfacing piping associated with the following systems:

- Chemical and Volume Control,
- Residual Heat Removal;
- Safety Injection,
- Sampling
- Pressurizer (i.e., safety and relief valve discharge lines to the PRT),
- Auxiliary support piping for the PRT, and
- RCS drain and instrument piping.

The RCS piping contains demineralized borated water which is circulated at the flow rate and temperature consistent with achieving the design reactor core thermal and hydraulic performance. The RCS provides sufficient heat transfer capability to transfer the heat produced by the reactor during power operation and the initial phase of plant cooldown to the steam and power conversion system and, during plant cooldown to cold shutdown conditions, to the RHR System. The RCS heat removal capability under power operation and normal operational transients, including the transition from forced to natural circulation, assures no fuel damage within the operating bounds permitted by the reactor control and protection systems.

The RCS provides the water used as the core neutron moderator and reflector and as a solvent for chemical shim reactivity control. The RCS maintains the homogeneity of soluble neutron poison concentration and rate of change of coolant temperature such that uncontrolled reactivity changes do not occur.

RCS piping serves as a boundary for containing the coolant under operating temperature and pressure conditions and for limiting coolant leakage and radioactivity release to the containment atmosphere.

The RCS includes selected piping associated with the PRT. The PRT spray header and nitrogen supply piping penetrates Containment and is, therefore, required for containment isolation. This piping is included in the RCS; however, the associated Containment Isolation Valves are included in Pressurizer System.

RCS piping interfaces with the RVLIS and includes components needed for RG 1.97, Category 1 monitoring requirements for system operating parameters.

The RCS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The RCS meets the scoping criteria for fire protection, EQ, and Station Blackout (SBO).

Based on the above discussion, the RCS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Removal of heat from the reactor to prevent core damage, • Providing water for neutron moderation and reflection and reactivity control, • Support of the containment isolation function, • Support of post accident monitoring, and • Supporting the RCPB function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The RCS is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components that are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and SBO events, and

4. Components that are part of the EQ Program.

<u>FSAR and Drawing References</u>

The RCS is described in FSAR Sections 5.1, 5.2, and 5.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the RCS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0800-LR 5-G-0801-LR 5-G-0844-LR

Components Subject to Aging Management Review

The table below identifies the RCS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation – Reactor Coolant System.

TABLE 2.3.1-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR COOLANT SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Class 1 Piping, Fittings and Branch Connections < NPS 4	M-1 Pressure-Boundary
Closure Bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary

2.3.1.4 Reactor Coolant Pump and Motor

System Description

The Reactor Coolant Pump (RCP) is a vertical, single stage, controlled leakage, centrifugal pump designed to pump large volumes of reactor coolant. The pump assembly consists of three major sections: the hydraulic suction, the seals, and the motor.

a) The hydraulic section consists of the casing, thermal barrier, impeller, turning vane-diffuser, and diffuser adapter.

b) The seal section consists of three seals arranged in series. The first is a controlled leakage, film-riding seal; the second and third are rubbing-face seals. The seal system provides a pressure reduction from the RCS pressure to ambient conditions.

c) The motor section consists of an induction motor with a solid shaft, oil lubricated bearings, and a flywheel.

Additional components of the pump are the shaft, pump radial bearing, thermal barrier heat exchanger assembly, coupling, spool piece, and motor stand.

The reactor coolant enters the suction nozzle, is pumped by the impeller through the diffuser, and exits through the discharge nozzle. The diffuser adapter limits the leakage of reactor coolant back to the suction. Seal injection flow, under slightly higher pressure than the reactor coolant, enters the pump through a connection on the main flange. Most of this injection water flows down through a cavity between the main flange and the thermal barrier and out through the thermal barrier heat exchanger into the RCS. The remaining injection water passes through the radial bearing and up through the seals. Component cooling water is provided to the thermal barrier heat exchanger. During normal operation, the thermal barrier limits the heat transfer from hot reactor coolant to the radial bearing and to the seals. In addition, if a loss of seal injection flow should occur, the thermal barrier heat exchanger cools the reactor coolant to an acceptable level before it enters the bearing and seal area. All parts of the pump in contact with the reactor coolant are austenitic stainless steel except for seals, bearings and special parts. The reactor coolant pump motor bearings are of conventional design. Component cooling water is supplied to the external upper bearing oil cooler and to the integral lower bearing oil cooler. The motor is an air-cooled, Class B thermalastic epoxy-insulated, squirrel cage induction motor. A flywheel and an anti-reverse rotation device are located at the top of the motor.

It is important to reactor protection that the reactor coolant continues to flow for a short time after reactor trip. In order to provide this flow during a loss of electrical power, each RCP is provided with a flywheel. Thus, the rotating inertia of the pump, motor and flywheel is employed during the coastdown period to continue the reactor coolant flow.

The RCPs assure an adequate core cooling flow rate for sufficient heat transfer to prevent departure from nucleate boiling. The required net positive suction head is by conservative pump design always less than that available by system design and operation. Sufficient pump rotation inertia is provided by the flywheel, in conjunction with the pump and motor rotor assemblies, to provide adequate flow during coastdown. This forced flow following an assumed loss of pump power and the subsequent natural circulation effect provides the core with adequate cooling.

The integrity of the RCP Thermal Barriers and RCP Motor Bearing Oil Coolers is required to maintain the CCW system pressure boundary.

The RCPs supply coolant flow to remove heat from the reactor core and transfer it to the steam generators. The RCPs are an integral part of the RCPB.

The Reactor Coolant Pump and Motor System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The RCP and Motor System meets the scoping criteria for fire protection. In order to reduce the possibility of fire, the system includes an oil collection system. The system also supports the post-fire functions of RCS inventory and pressure control.

Based on the above discussion, the RCP and Motor System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provide rotating inertia to maintain RCS flow and prevent core damage following RCP trip, • Contains components that support the Component Cooling Water System pressure boundary function, and • Supporting the RCPB function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The RCP and Motor System is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components that are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The Reactor Coolant Pump and Motor are discussed in FSAR Section 5.4.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Reactor Coolant Pump and Motor are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0800-LR

Components Subject to Aging Management Review

The table below identifies the Reactor Coolant Pump and Motor components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation – Reactor Coolant Pump and Motor.

TABLE 2.3.1-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR COOLANT PUMP AND MOTOR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Reactor Coolant Pumps (Casings)	M-1 Pressure-Boundary
Reactor Coolant Pump Closure Bolting	M-1 Pressure-Boundary
RCP Oil Cooler/Heat Exchanger Components	M-1 Pressure-Boundary
RCP Thermal Barrier Heat Exchanger Components	M-1 Pressure-Boundary
Closure Bolting	M-1 Pressure-Boundary
RCP Lube Oil Collection Tank	M-1 Pressure-Boundary
RCP Oil Spill Protection System Piping	M-1 Pressure-Boundary

2.3.1.5 Pressurizer

System Description

The Pressurizer is a vertical, cylindrical vessel with hemispherical top and bottom heads constructed of carbon steel, with austenitic stainless steel cladding on all internal surfaces exposed to the reactor coolant. A stainless steel liner is used in lieu of cladding in some nozzles. The Pressurizer is connected to the hot leg of one of the reactor coolant loops by a surge line. Electric heaters are installed through the bottom head of the vessel while the spray nozzle and the relief valve and safety valve connections are located in the top head of the vessel.

RCS pressure is controlled by the use of the Pressurizer where water and steam are maintained in equilibrium by electrical heaters and water sprays. Steam can be formed (by the heaters) or condensed (by pressurizer spray) to minimize pressure variations due to contraction and expansion of the reactor coolant. Spring loaded safety valves and power operated relief valves (PORVs) discharge from the Pressurizer to the PRT, where discharged steam is condensed and cooled by mixing with water. The Pressurizer maintains RCS system pressure during operation and limits pressure transients. During the reduction or increase of plant load, reactor coolant volume changes are accommodated in the Pressurizer via the surge line.

The Pressurizer Safety Valves are of the totally enclosed pop-type. The valves are spring loaded, self activated with backpressure compensation. The Pressurizer Safety Valves provide overpressure protection of the RCS. The PORVs limit system pressure for large power mismatches. They are operated automatically or by remote manual control. Remotely operated valves are provided to isolate the inlet to the power operated relief valves from the RCS if excessive leakage through the PORVs should occur.

The pressurizer PORVs are designed to limit pressurizer pressure to a value below the fixed high pressure reactor trip setpoint. They are pneumatically operated and are designed to fail to the closed position on loss of electrical power to the control solenoid valves or should the supply of nitrogen or instrument air be removed. The valves may be used to mitigate a Steam Generator Tube Rupture (SGTR) event. Pneumatic accumulators are provided; the accumulators store sufficient nitrogen to operate the valves.

The PORVs are also used as an alternative method for depressurizing the RCS while achieving cold shutdown. The pressurizer vent system portion of the RCS High Point Vent System is also capable of relieving RCS pressure as needed. The vent line connects to a sampling line at the top or the Pressurizer. These means of depressurizing are available as backups to the auxiliary spray for providing the depressurization function during normal, emergency, and natural circulation cooldown.

Thermal sleeves are installed at the pressurizer end of the pressurizer surge line, and the pressurizer spray line connections to the Pressurizer. The surge line and thermal sleeve are designed to withstand the thermal stresses resulting from volume surges of relatively hotter or colder water which may occur during operation.

The Pressurizer System includes the Pressurizer Safety Valves, the PORVs, and Main and Bypass Spray Valves. This system also includes the PORV accumulators and associated nitrogen supply components. The PRT is included in the Pressurizer System. The PRT is a horizontal, cylindrical vessel with elliptical heads. Steam from the pressurizer safety and PORVs is discharged into the PRT through a sparger pipe under the water level. This condenses and cools the steam by mixing it with water that is near ambient temperature. The PRT is fabricated from austenitic stainless steel.

The Pressurizer is part of the RCPB and functions to mitigate SGTRs, events that may cause RCS overpressure, and events that require depressurizing the RCS to achieve cold shutdown conditions. The Pressurizer provides a bleed path for bleed-and-feed cooling of the RCS. The Pressurizer is required for RCS pressure control; however pressure control and Pressurizer water level control during normal power operation are not safety related functions.

The Pressurizer meets the scoping criteria for fire protection, environmental qualification, and station blackout.

The Pressurizer includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1, requirement.

The Pressurizer is provided with water level instrumentation required for RG 1.97, Category 1, Post-Accident Monitoring.

The Pressurizer contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Pressurizer performs the following system intended functions.

10 CFR54.4(a)(1) Functions	• Provides RCS overpressure protection during accidents and transients, • Mitigation of SGTR events, • Provides a-bleed flow path for feed-and bleed cooling of the RCS, • Supports post-accident monitoring functions, • Contains components that support the containment isolation function, and • Supports the RCPB function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Pressurizer is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components that are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Pressurizer is discussed in FSAR Sections 5.4.10, 5.4.13, and 7.7.1.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Pressurizer are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0801-LR 5-G-0809-LR

Components Subject to Aging Management Review

The table below identifies the Pressurizer components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-5 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation – Pressurizer.

TABLE 2.3.1-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRESSURIZER

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Pressurizer Shell	M-1 Pressure-Boundary
Pressurizer Lower Head	M-1 Pressure-Boundary
Pressurizer Upper Head	M-1 Pressure-Boundary
Pressurizer Valve Support Bracket Lugs	M-4 Structural Support
Pressurizer Spray Nozzle	M-1 Pressure-Boundary
Pressurizer Relief Nozzle	M-1 Pressure-Boundary
Pressurizer Safety Nozzle	M-1 Pressure-Boundary
Pressurizer Surge Nozzle	M-1 Pressure-Boundary
Pressurizer Spray Head	M-8 Spray Pattern
Pressurizer Spray Head Coupling	M-4 Structural Support
Pressurizer Spray Head Locking Bar	M-4 Structural Support
Pressurizer Surge Nozzle Thermal Sleeve	M-6 Thermal Insulation
Pressurizer Spray Nozzle Thermal Sleeve	M-6 Thermal Insulation
Pressurizer Instrument Nozzles	M-1 Pressure-Boundary
Pressurizer Spray Nozzle Safe End	M-1 Pressure-Boundary
Pressurizer Relief Nozzle Safe End	M-1 Pressure-Boundary
Pressurizer Safety Nozzle Safe End	M-1 Pressure-Boundary

TABLE 2.3.1-5 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRESSURIZER

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Pressurizer Surge Nozzle Safe End	M-1 Pressure-Boundary
Pressurizer Manway Covers/Insert	M-1 Pressure-Boundary
Pressurizer Manway Studs	M-1 Pressure-Boundary
Pressurizer Manway Nuts	M-1 Pressure-Boundary
Pressurizer Manway Pad Gasket Seating Surface	M-1 Pressure-Boundary
Pressurizer Heater Well Nozzles	M-1 Pressure-Boundary
Pressurizer Immersion Heaters	M-1 Pressure-Boundary
Pressurizer Support Skirt and Flange	M-4 Structural Support
Pressurizer Seismic Lugs	M-4 Structural Support
Pressurizer Relief Tank Shell and Heads	M-1 Pressure-Boundary
Pressurizer Relief Tank Flanges	M-1 Pressure-Boundary
Pressurizer Relief Tank Nozzles	M-1 Pressure-Boundary
Pressurizer Relief Tank Rupture Disk	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Filter Housings (Air/Gas)	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Pressurizer PORV Accumulators	M-1 Pressure-Boundary
Pressurizer PORV Flex Hoses	M-1 Pressure-Boundary
Regulators	M-1 Pressure-Boundary

2.3.1.6 Steam Generator

System Description

The original HNP Steam Generators (SGs) were Westinghouse Model D4s, a preheater type SG with Alloy 600 mill-annealed tubes. These SGs experienced tube degradation, degradation of tube support components, and other problems similar to industry-wide experience with this model. In the Fall of 2001, these SGs were replaced with Westinghouse model Delta 75 SGs.

The primary function of the SGs is to transfer heat from reactor coolant loop to the feedwater to generate steam for the turbine generator.

The HNP SGs are vertical shell and U-tube type heat exchangers with integral moisture separators. On the primary side, the reactor coolant flows through the inverted U-tubes, entering and leaving through nozzles located in the hemispherical bottom head of the SG. The head is divided into inlet and outlet chambers by a vertical divider plate extending from the head to the tube sheet. Steam is generated on the shell side, flows upward and exits through the outlet nozzle at the top of the vessel. During normal operation, feedwater is introduced into the SG via a main feedwater nozzle located in the upper shell. The nozzle contains an Alloy 690 thermal liner welded to the nozzle and the feedwater ring, which minimizes the impact on the nozzle of rapid feedwater temperature transients. The feed ring utilizes top discharge spray nozzles, spaced uniformly around the feed ring, that distribute the feedwater into the upper shell recirculating water inventory. The recirculating water consisting of water separated from the steam and the water from the feedwater nozzle, travels downward from the steam dome in an annulus region formed between the SG shell and an internal wrapper plate. An open area at the bottom of the wrapper barrel permits the water to enter the tube bundle. The water flows upward through the tube bundle. A water/steam mixture flows into the steam drum section, where 18 primary centrifugal moisture separators remove most of the entrained water from the steam. The steam continues to the secondary separators for further moisture removal, increasing its quality to a minimum of 99.9 percent. The moisture separators recirculate the separated water back to the recirculating water pool for another passage through the SG. Dry steam exits through the outlet nozzle. A steam flow restrictor is welded to the steam outlet nozzle. The steam flow restrictor is designed to limit steam flow rate from the SG in the unlikely event of a break in the main steam line.

The SGs are required to maintain both RCPB integrity and secondary side pressure boundary integrity. The SGs provide a heat sink for the reactor core during normal operating and shutdown conditions and during accident conditions.

SG level instrumentation is required for Post-Accident Monitoring; however, these components are part of the NSSS Process Instrumentation System.

The SG System meets the scoping criteria for fire protection and anticipated transients without scram.

Based on the above discussion, the SG System performs the following system intended functions.

10 CFR54.4(a)(1) Functions	• Provides a heat sink for the reactor core during normal and accident conditions, • Limit steam flow in the event of a Main Steam Line Break (MSLB), • Support the secondary side pressure boundary integrity, and • Supports the RCPB function.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and ATWS.

The SG is in the scope of License Renewal because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components that are relied on during postulated fires and anticipated transients without scram,

FSAR and Drawing References

The SG is discussed in FSAR Section 5.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the SG are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0044-LR 5-G-0800-LR

Components Subject to Aging Management Review

The table below identifies the SG components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.1.2-6 Reactor Vessel, Internals, and Reactor Coolant System - Summary of Aging Management Evaluation – Steam Generator.

TABLE 2.3.1-6 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM GENERATOR

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Instrument Manifolds and Valves	M-1 Pressure-Boundary
Elliptical Head	M-1 Pressure-Boundary
Steam Nozzle	M-1 Pressure-Boundary
Steam Nozzle Flow Limiter	M-3 Throttle
Steam Generator Upper Shell	M-1 Pressure-Boundary
Steam Generator Lower Shell	M-1 Pressure-Boundary
Steam Generator Transition Cone	M-1 Pressure-Boundary
Feedwater Nozzle	M-1 Pressure-Boundary
Feedwater Nozzle Thermal Sleeve	M-4 Structural Support M-6 Thermal Insulation

TABLE 2.3.1-6 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM GENERATOR

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Auxiliary Feedwater Nozzle	M-1 Pressure-Boundary
Auxiliary Nozzle Thermal Sleeve	M-1 Pressure-Boundary M-6 Thermal Insulation
Steam generator feedwater impingement plate and support	M-3 Throttle
Secondary Manway Covers	M-1 Pressure-Boundary
Secondary Manway Bolting	M-1 Pressure-Boundary
Inspection Port and Handhole Covers	M-1 Pressure-Boundary
Inspection Port and Handhole Closure Bolting	M-1 Pressure-Boundary
Sludge Collector Maintenance Opening Covers	M-1 Pressure-Boundary
Sludge Collector Maintenance Openings Closure Bolting	M-1 Pressure-Boundary
Channel Head	M-1 Pressure-Boundary
Steam Generator; Divider Plate	M-4 Structural Support
Steam Generator Support Ring	M-4 Structural Support
Steam Generator Primary Nozzles	M-1 Pressure-Boundary
Steam Generator Primary Nozzle Safe Ends	M-1 Pressure-Boundary
Secondary Side Shell Penetrations (except Steam and Feedwater)	M-1 Pressure-Boundary
Primary Manway Cover/Inserts	M-1 Pressure-Boundary
Primary Manway Bolting	M-1 Pressure-Boundary
Tubeplate	M-1 Pressure-Boundary M-4 Structural Support
Tubes	M-1 Pressure-Boundary M-5 Heat Transfer
Tube plugs	M-1 Pressure-Boundary
Tube Support Plates and Flow Distribution Baffles	M-4 Structural Support
Steam generator; tube bundle wrapper	M-3 Throttle M-4 Structural Support
Steam generator; anti-vibration bars	M-4 Structural Support
Tube Bundle Support Hardware	M-4 Structural Support
Feedwater Distribution Ring and Supports	M-4 Structural Support
Feedwater Distribution Ring Spray Nozzles	M-4 Structural Support
Auxiliary Feedwater Internal Spray Pipe	M-1 Pressure-Boundary M-8 Spray Pattern
Moisture Separator Assembly	M-4 Structural Support
Miscellaneous Non-Pressure Boundary Internals	M-4 Structural Support

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

Engineered Safety Features Systems consist of systems and components designed to function under accident conditions to minimize the severity of an accident or to mitigate the consequences of an accident. Sections 1.2.2.3, 6.5.1, 7.1.1, and 9.4.5 and FSAR Table 7.3.1-1 identify the engineered safety features (ESF) systems, and they are listed below. Automatic actuation of ESF systems is performed by the ESF Actuation System described in FSAR Section 7.3. Note that every ESF system is not included in this Subsection. To achieve better alignment with NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," some of the following ESF systems and the Containment structure are discussed in other Subsections as indicated.

1. Containment Building (Refer to Subsection 2.4.1)

2. Containment Cooling System (Refer to Subsection 2.3.3.63.)

3. Containment Spray System (Refer to Subsection 2.3.2.1.)

4. Containment Isolation System (Refer to Subsection 2.3.2.2.)

5. Combustible Gas Control

   In order to control the buildup of hydrogen gas following an accident, the HNP design considers the mechanisms of hydrogen recombination, hydrogen monitoring, hydrogen purge, and hydrogen mixing. The first two of these mechanisms are accomplished by the Post-Accident Hydrogen System. Hydrogen purge is performed by the Containment Purge System. And mixing of hydrogen is accomplished by the Containment Cooling System. These systems are addressed in the following Subsections:

   a. Post-Accident Hydrogen System (Refer to Subsection 2.3.3.83.)
   b. Containment Purge System (Refer to Subsection 2.3.3.65.)
   c. Containment Cooling System (Refer to Subsection 2.3.3.63.)

6. Emergency Core Cooling System

   The Safety Injection System is composed of three subsystems that enable it to perform its function over a wide range of RCS accident conditions. These subsystems are the High Head Safety Injection System, the Low Head Safety Injection System, and the Passive Safety Injection System. The Residual Heat Removal System is included as part of the Low Head Safety Injection System. These systems collectively make up the "Emergency Core Cooling System" (ECCS) as described in the FSAR. Therefore, the systems that perform the ECCS function are:

a. High Head Safety Injection System
(Refer to Subsection 2.3.2.3.)
b. Low Head Safety Injection System, which is accomplished by the RHR pumps (Refer to Subsection 2.3.2.4.)
c. Passive Safety Injection, which is accomplished by the Safety Injection Accumulators (Refer to Subsection 2.3.2.5.)

7. Emergency Exhaust System

The ESF Systems that compose the Emergency Exhaust System are:

a. Fuel Handling Building Emergency Exhaust System
(Refer to Subsection 2.3.3.76.)
b. Reactor Auxiliary Building Emergency Exhaust System
(Refer to Subsection 2.3.3.69)

8. Auxiliary Feedwater System (Refer to Subsection 2.3.4.8.)

9. Main Steam Line Isolation System (Refer to Subsection 2.3.4.3.)

10. Main Feedwater Isolation System (Refer to Subsection 2.3.4.6.)

11. Control Room Habitability Systems

The Control Room Habitability Systems include equipment, supplies and procedures which give assurance that the control room operators can remain in the Control Room and take effective actions to operate the nuclear power plant safely under normal conditions and maintain the facility in a safe condition following a postulated accident as required by 10 CFR Part 50, Appendix A, General Design Criterion 19. Habitability systems and provisions include: a) Control Room Air Conditioning System (CRACS), which includes the Control Room Emergency Filtration System (CREFS), b) radiation protection provided by the Control Room structure, c) food and water storage, d) kitchen and sanitary facilities, and e) bottled air breathing apparatus. CRACS and CREFS are part of the Control Room Area Ventilation System. (Refer to Subsection 2.3.2.6.)

12. ESF Filter Systems (Refer to Subsection 2.3.3.76 for the Fuel Handling Building (FHB), Subsection 2.3.3.69 for the Reactor Auxiliary Building, and Subsection 2.3.2.6 for the Control Room Area Ventilation System.)

13. ESF Ventilation Systems (Refer to Subsection 2.3.3.69 for the Reactor Auxiliary Building Ventilation System, Subsection 2.3.3.74 for the Fuel Oil Transfer Pump House Ventilation System, Subsection 2.3.3.73 for the Diesel Generator Building Ventilation System, Subsection 2.3.3.70 for the ESW Intake Structure Ventilation

System, and Subsection 2.3.3.76 for the Fuel Handling Building Ventilation System.)

Based on the above, the following ESF Systems are addressed in this Subsection:

1. Containment Spray System (Subsection 2.3.2.1)

2. Containment Isolation System (Subsection 2.3.2.2)

3. High Head Safety Injection System (Subsection 2.3.2.3)

4. Low Head Safety Injection and Residual Heat Removal System (Subsection 2.3.2.4)

5. Passive Safety Injection System (Subsection 2.3.2.5)

6. Control Room Area Ventilation System (Subsection 2.3.2.6)

2.3.2.1 Containment Spray System

System Description

The Containment Spray System (CSS) consists of two independent and redundant loops each containing a spray pump, piping, valves, spray headers, and spray valves. All essential equipment of the CSS is located outside the Containment, except for spray headers, nozzles, containment sump, and associated piping.

The CSS has two principal modes of operation which are: a) the injection mode, in which the system sprays borated water taken from the Refueling Water Storage Tank (RWST), and b) the recirculation mode, in which water is taken from the Containment sumps.

The CSS is automatically energized by the Containment Spray Actuation Signal (CSAS). This signal energizes the CSS by starting the containment spray pumps and opening the containment spray isolation valves; and borated water from the RWST is discharged into the Containment through the containment spray headers. The operating mode of the CSS is automatically changed from injection mode to recirculation mode by transferring the suction of the pump to the containment sump, opening the valves in the sump recirculation lines and closing the valves from the RWST. This switchover is initiated by a low-low RWST level signal. The CSAS will initiate the operation of the sodium hydroxide addition system and the two sodium hydroxide system valves will open and admit the chemical to the two separate trains of the CSS. Each train of CSS has two headers which conform to the shape of the Containment and contain spray nozzles.

The purpose of the CSS is to spray borated sodium hydroxide solution into the containment to cool the atmosphere, to provide pH control of the spray, to remove the fission products that may be released into the containment atmosphere following a postulated Loss of Coolant Accident (LOCA) or Main Steam Line Break (MSLB), and to control reactivity by borating the containment sump fluid.

The CSS is required to function following a LOCA, following a safe shutdown earthquake, and under post-accident environmental conditions. Therefore, this system is safety related and seismic Category I. The CSS provides adequate capability for the fission product scrubbing of the containment atmosphere following a LOCA so that offsite doses and doses to operators in the Control Room are within the guidelines of 10 CFR 50.67.

The CSS includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97 Category 1 requirement.

The CSS includes components required for post-accident monitoring. RG 1.97, Category 1, parameters monitored include RWST level, containment sump level, containment water level, containment pressure, and sodium hydroxide tank level.

The CSS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The CSS meets the scoping criteria for Fire Protection, EQ, and SBO.

Based on the above discussion, the CSS performs the following system Intended functions:

10 CFR54.4(a)(1) Functions	• Provides spray flow to Containment to cool the atmosphere and remove fission products following a LOCA or MSLB, • Provides a source of borated water for core cooling and reactivity control, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The CSS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The CSS System is described in Sections 6.2.2.2.2 and 6.5.2 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CSS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0050-LR

Components Subject to Aging Management Review

The table below identifies the CSS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.2.2-1 Engineered Safety Features - Summary of Aging Management Evaluation – Containment Spray System.

TABLE 2.3.2-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT SPRAY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure Bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Containment Spray Additive Tank	M-1 Pressure-Boundary
Containment Spray Nozzles	M-1 Pressure-Boundary M-8 Spray Pattern

TABLE 2.3.2-1 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT SPRAY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Containment Spray Pumps	M-1 Pressure-Boundary
Flow Restricting Elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary
Refueling Water Storage Tank	M-1 Pressure-Boundary

2.3.2.2 Containment Isolation System

System Description

The Containment Isolation System consists of the valves and actuators required to isolate the Containment following a LOCA, MSLB, or a fuel handling accident inside the Containment.

The pressure boundary portions of electrical penetrations and miscellaneous/spare mechanical penetrations are included in the civil structural screening described in Section 2.4. The electrical portions of containment electrical penetrations are included in the electrical screening described in Section 2.5.

Systems that include primary containment isolation valves are:

1. Reactor Vessel and Internals (includes the RVLIS)
2. Reactor Coolant System
3. Pressurizer System
4. Containment Spray System
5. High Head Safety Injection System
6. Low Head Safety Injection and RHR System
7. Passive Safety Injection System
8. Chemical and Volume Control System
9. Primary Sampling System
10. Post-Accident Sampling System
11. Normal Service Water System
12. Emergency Service Water System
13. Component Cooling Water System
14. Instrument Air System
15. Service Air System
16. Fire Protection System

17. Radioactive Equipment Drains System
18. Demineralized Water System
19. Radiation Monitoring System
20. Gaseous Waste Processing
21. Refueling System
22. Spent Fuel Pool Cleanup System
23. Containment Vacuum Relief System
24. Containment Pressurization System
25. Penetration Pressurization System
26. Containment Atmosphere Purge Exhaust System
27. Post-Accident Hydrogen System
28. Steam Generator Blowdown System
29. Main Steam System
30. Feedwater System
31. Auxiliary Feedwater System
32. Secondary Sampling System

Containment isolation valves for these systems are listed in Table 6.2.4-1 of the FSAR and are included in the screening results described elsewhere in this Section for the above systems.

FSAR and Drawing References

The Containment Isolation System is described in Section 6.2.4 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Isolation System are identified in the discussion of the applicable systems elsewhere in this Section.

Components Subject to Aging Management Review

Containment Isolation System components for the above systems have been screened during the screening of each system that contains containment isolation valves. Therefore, the Containment Isolation System components that require aging management review are included in the screening results for each system described elsewhere in this Section. No separate listing of Containment Isolation System components/commodities requiring aging management review is provided.

2.3.2.3 High Head Safety Injection System

System Description

The High Head Safety Injection (HHSI) System supplies cooling water to the RCS when the RCS leak rate is relatively small or nonexistent, as during a main steam or feedwater line break, and the RCS pressure is high.

The HHSI System functions in conjunction with the Chemical and Volume Control System (CVCS) and the CSS via the RWST to deliver borated water to the RCS following a postulated LOCA, MSLB, or other event that affects the RCS liquid inventory. The HHSI System relies upon the charging and safety injection (CSI) pumps which take suction on the RWST. The CSI pumps are part of the CVCS discussed in Subsection 2.3.3.1. The HHSI System is also active during the recirculation phase, when the Residual Heat Removal (RHR) pumps are aligned with the CSI pumps.

The HHSI System components include the Boron Injection Tank (BIT), and associated piping, flow elements, and strainers. The HHSI System includes piping from the CSI pump discharge header to the RCS hot legs and cold legs. This includes a flow path through the BIT to the RCS cold legs. Upon actuation of a Safety Injection Signal (SIS), the pumps deliver boric acid solution from the RWST into the RCS by way of the BIT. In the original design of the ECCS, the BIT contained a high concentration boric acid solution. This highly concentrated boric acid solution was determined to be unnecessary and has been eliminated. The BIT has been left in place but it serves no function other than being part of the safety injection flow path.

The HHSI System includes nitrogen gas/air supply piping between the Pressurizer PORVs and the pneumatic accumulators for the PORVs. For this reason, the HHSI System supports the Pressurizer system intended functions that involve actuation of the PORVs.

The HHSI System includes Class 1 piping required to maintain the RCPB.

The HHSI System includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The HHSI System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The HHSI System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with Nuclear Regulatory Commission (NRC) regulations for fire protection, EQ, and SBO.

Based on the above discussion, the HHSI System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Delivers borated water to the reactor core following events that result in loss of RCS inventory volume to cool the core and provide reactivity control, • Supports the recirculation phase of ECCS operation following a loss of RCS inventory, • Supports delivery of air or nitrogen to Pressurizer PORVs in support of Pressurizer intended functions, • Contains components that provide the RCPB function, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The HHSI System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The HHSI System is described in Section 6.3 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the HHSI System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0808-LR 5-G-0809-LR 5-G-0810-LR

Components Subject to Aging Management Review

The table below identifies the HHSI System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.2.2-2 Engineered Safety Features - Summary of Aging Management Evaluation – High Head Safety Injection System.

TABLE 2.3.2-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: HIGH HEAD SAFETY INJECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure Bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Flow Restricting Elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary

2.3.2.4 Low Head Safety Injection / Residual Heat Removal System

System Description

The Low Head Safety Injection (LHSI) System includes the RHR System and is one of three subsystems comprising the ECCS. The LHSI provides reactor core protection when the RCS leak rate is large and the RCS pressure has become low. The LHSI/RHR system includes the Residual Heat Exchangers, RHR Pumps, flow orifices, seal coolers, and associated valves and piping.

The LHSI and the RHR Systems function together in conjunction with the CSS to deliver borated water to the RCS. The RHR Pumps are aligned during normal operation to take suction from the RWST and discharge through the RHR Heat Exchangers to the RCS cold legs through two check valves in series. The RHR Pumps are automatically started by an SIS. The ability of this system to deliver cooling water to the RCS is limited by the total dynamic head of the RHR pumps. During the injection phase, these pumps remain on minimum bypass flow only, with suction aligned from the RWST, until RCS pressure decreases below the discharge pressure of the pumps. When the RWST reaches a low-low setpoint, the suction of the pumps will automatically divert to the containment sump. Operator action is required to isolate the RWST to the RHR Pump suction, to align the CSI pump suction to the discharge of the RHR pumps, and to align Component Cooling Water (CCW) flow to the RHR heat exchangers and pumps.

During the recirculation phase, the RHR pumps supply water to the suction of the CSI pumps and, if the reactor coolant pressure is low enough, directly to the RCS.

During ECCS recirculation, the RHR System provides additional net positive suction head to the CSI pumps and provides a flow path to support HHSI system functions. Each train of RHR shares a common sump with a train of the CSS.

The RHR pumps and the safety injection system piping provide a pressurized water seal to containment penetrations M-13, M-14, M-17, M-18, M-20, M-21, and M-22 for a minimum period of 30 days following a design basis accident. This seal is maintained following any single active failure. This water seal ensures that the containment atmosphere cannot leak to the environment following a design basis accident.

The RHR System provides a sample flow path from the RCS to the Post Accident Sampling System.

During normal plant shutdown, the RHR System cools the RCS to cold shutdown conditions. The RHR System provides for the dissipation of heat from the RCS during periods of plant operation after the RCS temperature has been reduced to a nominal value. During refueling operations, the RHR pumps are used to transfer borated water between the RWST and the reactor refueling cavity. Suction or discharge alignment to the reactor cavity is attained through the normal flow paths when the reactor vessel head has been lifted clear of the flange mating surface. The RHR system provides an adequate cooling medium during spent fuel handling and transfer.

The lines from the RCS hot legs to the RHR pump suctions each contain two remote manual motor-operated valves to serve as the boundary between the RCS and the RHR System.

The RHR System provides the capability to monitor RHR pump performance during mid-loop operations.

The LHSI/RHR System includes Class 1 piping required to maintain the RCS pressure boundary and includes components required for Containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

In addition, the LHSI/RHR System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The LHSI/RHR System meets the scoping criteria for Fire Protection, EQ, and SBO.

Based on the above discussion, the LHSI/RHR System provides the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides for heat removal during normal shutdown conditions, • Provides low pressure ECCS following a design basis accident, • Provides heat removal from containment following a design basis accident, • Provides a post-accident sampling flow path, • Contains components that provide the RCPB function, • Provides net positive suction head for the CSI pumps during ECCS recirculation, • Provides a pressurized water seal to several containment penetrations, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The LHSI/RHR System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The LHSI/RHR System is described in Sections 6.3.2 and 5.4.7 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the LHSI/RHR System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0810-LR

5-G-0824-LR

Components Subject to Aging Management Review

The table below identifies the LHSI/RHR System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.2.2-3 Engineered Safety Features - Summary of Aging Management Evaluation – Low Head Safety Injection/Residual Heat Removal System.

TABLE 2.3.2-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LOW HEAD SAFETY INJECTION / RESIDUAL HEAT REMOVAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure Bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Flow Restricting Elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary
RHR Heat Exchanger Components	M-1 Pressure-Boundary
RHR Heat Exchanger Tubes	M-5 Heat Transfer
RHR Pump Seal Water Cooler Components	M-1 Pressure-Boundary
RHR Pump Seal Water Cooler Tubes	M-5 Heat Transfer
RHR Pumps	M-1 Pressure-Boundary

2.3.2.5 Passive Safety Injection System

System Description

The Passive Safety Injection (PSI) System is one of three subsystems comprising the ECCS. The PSI System is the subsystem that functions at the intermediate RCS pressure, where the HHSI System is not entirely effective because of the high leak rate involved and the LHSI System is not yet operable.

The PSI function is provided by SI Accumulators. The Accumulators are pressure vessels partially filled with borated water and pressurized with nitrogen gas. During normal operation each SI Accumulator is isolated from the RCS by two check valves in series. Should the RCS pressure fall below the accumulator pressure, the check valves open and borated water is forced into the RCS. One SI Accumulator is attached to each of the cold legs of the RCS. Mechanical operation of the swing disc check valves is the only action required to open the injection path from the accumulators to the core via the cold leg. Connections are provided for remotely adjusting the level and boron concentration of the borated water in each accumulator during normal plant operation as required. Accumulator water level may be adjusted either by draining to the RWST or by supplying borated water from the RWST. Accumulator pressure is provided by a supply of nitrogen gas, and can be adjusted as required during normal plant operation; however, the SI Accumulators are normally isolated from this nitrogen supply. Gas relief valves on the Accumulators protect them from pressures in excess of their design pressure. Motor operated isolation valves are provided for each accumulator, however these valves are open during plant operation and power is locked out to prevent inadvertent closure. The PSI System components include the accumulators, piping, valves, flow elements, and associated instrumentation.

As stated above, makeup to the SI Accumulators is provided by pumping borated water from the RWST. This is done using a hydrostatic test pump. The hydrostatic test pump serves no safety function and is normally isolated from the process piping during normal plant operation.

The PSI System includes Class 1 piping required for the RCPB function.

The PSI System includes components required to provide nitrogen for Pressurizer PORV operation.

The PSI System includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The PSI System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The PSI System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection, EQ, and SBO.

Based on the above discussion, the PSI System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Delivers borated water to the RCS following a design basis accident, • Provides nitrogen to support Pressurizer PORV functions, • Contains components that provide the RCPB function, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The PSI System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,
3. Components that are relied on during postulated fires and station blackout events,and
4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The PSI System is described in detail Section 6.3 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the PSI System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0809-LR 5-G-0810-LR

Components Subject to Aging Management Review

The table below identifies the PSI System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.2.2-4 Engineered Safety Features - Summary of Aging Management Evaluation – Passive Safety Injection System.

TABLE 2.3.2-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PASSIVE SAFETY INJECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure Bolting	M-1 Pressure-Boundary
Cold Leg Accumulators	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary

2.3.2.6 Control Room Area Ventilation System

<u>System Description</u>

The Control Room Area Ventilation System consists of safety related air conditioning and emergency filtration systems. The Control Room Air Conditioning System (CRACS) provides heating, ventilation, cooling, filtration, air intake and exhaust isolation, and maintains 50 percent relative humidity for the Control Room Envelope during normal operation and following a design basis accident. The Control Room Envelope, which is also referred to as the "Control Room," includes, in addition to the Control Room, the following auxiliary spaces: a) Office area, b) Relay and termination Cabinet Rooms, c) Kitchen and sanitary facilities and d) Component Cooling Water Surge Tank Room. The system is located in the RAB at the 286 ft. and 305 ft. elevations.

During normal operation, CRACS operates in a partial recirculation mode with the emergency filtration system de-energized. Outside makeup air is mixed with a portion of the returned air before being conditioned by the air handling units. The Control Room is maintained at a slightly positive pressure with respect to the adjacent area so that the air from other sources entering the Control Room is minimized. Pressurization of the Control Room is maintained automatically by means of modulating exhaust fan dampers. In the air handling units, air is cooled by a cooling coil; chilled water supply to the cooling coil is provided by the Essential Services Chilled Water System. When heating is required, the air is heated by electric heating coils to maintain the design space temperature. System exhaust is accomplished using two 100-percent capacity fans. The exhaust system is provided with two motorized isolation valves arranged in series and protected from tornado effects by means of a self-acting tornado damper.

Emergency operation of the system is initiated by an SIS, a high radiation signal at either the normal or emergency pressurization air intakes, or indication of smoke at the normal air intake. During emergency operation, the normal supply and exhaust flow paths are isolated, and the Control Room is pressurized using the Control Room Emergency Filtration System (CREFS). Emergency filtration by the CREFS is accomplished using two 100-percent capacity filtration trains arranged in parallel each containing a fan, valves, flow element, heating coil, demister, HEPA pre-filter, charcoal adsorber and HEPA after-filter. Each CREFS train can be independently fed from either of two emergency outside air intakes. During a radiological accident, the emergency filtration system will process a mixture of Control Room air and a small quantity of outside air through charcoal filters and maintain the Control Room Envelope under positive pressure of +1/8 in. water gauge. Air is continuously drawn from the supply air ductwork and blended with outside air, processed through the charcoal filtration system and supplied to the Control Room.

The system limits the radiation doses to Control Room personnel. Detection of radioactivity in the Control Room environment is provided by radiation monitors. This permits immediate and automatic isolation of the Control Room normal and emergency outside air intake and exhaust ducts upon receipt of a high radiation signal and enables the operator to select the least contaminated emergency outside air intake for Control Room pressurization.

In the event smoke is detected in the outside air intake duct during normal operation, an alarm will be annunciated in the Control Room and a CRIS will be generated together with the initiation of the emergency filtration system. Redundant, non-safety related purge fans may be aligned to the Control Room Area Ventilation System for smoke removal.

This system supports operation of the Control Room Envelope which has been designed to ensure continuous occupancy, without exceeding radiation exposure limits, during normal operation and extended occupancy throughout the duration of any one of the following postulated design basis accidents: a) loss of coolant accident, b) fuel handling accident, or c) radioactive releases due to a Radwaste System failure.

The Control Room Area Ventilation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Control Room Area Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification and fire protection.

Based on the above discussion, the Control Room Area Ventilation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides heating ventilation, cooling, filtration and humidity control for the Control Room Envelope during a design basis accident, • Supports habitability of the Control Room Envelope by protecting against airborne radioactivity, and • Permits continuous occupancy of the Control Room Envelope throughout the duration of design basis events. ,
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The Control Room Area Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Control Room Area Ventilation System is described in detail in Sections 6.4, 7.3.1.5.7, and 9.4.1 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Control Room Area Ventilation System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0517 S04-LR

Components Subject to Aging Management Review

The table below identifies the Control Room Area Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR for these components/commodities was performed in Section 3.3 together with other HVAC systems and the results are provided in Table 3.3.2-71 Auxiliary Systems - Summary of Aging Management Evaluation – Control Room Area Ventilation System.

TABLE 2.3.2-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL ROOM AREA VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Control Room Smoke Purge and Exhaust Fan Housings	M-1 Pressure-Boundary
Control Room Air Handling Unit and Emergency Filtration Unit Enclosure	M-1 Pressure-Boundary
Control Room Air Handling Unit and Emergency Filtration Unit Fan Housings	M-1 Pressure-Boundary
Control Room Air Handling Unit and Emergency Filtration Unit Filter Housings	M-1 Pressure-Boundary
Control Room Air Handling Unit Cooling Coil	M-5 Heat Transfer
Ducting	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3 AUXILIARY SYSTEMS

Auxiliary Systems are those systems used to support normal and emergency plant operations. The systems provide cooling, ventilation, sampling and other required functions. The following systems are included in this Subsection:

1. Chemical and Volume Control System (Subsection 2.3.3.1)
2. Boron Thermal Regeneration System (Subsection 2.3.3.2)
3. Primary Makeup System (Subsection 2.3.3.3)
4. Primary Sampling System (Subsection 2.3.3.4)
5. Post Accident Sampling System (Subsection 2.3.3.5)
6. Circulating Water System (Subsection 2.3.3.6)
7. Cooling Tower System (Subsection 2.3.3.7)
8. Cooling Tower Make-Up System (Subsection 2.3.3.8)
9. Screen Wash System (Subsection 2.3.3.9)
10. Main Reservoir Auxiliary Equipment (Subsection 2.3.3.10)
11. Auxiliary Reservoir Auxiliary Equipment (Subsection 2.3.3.11)
12. Normal Service Water System (Subsection 2.3.3.12)
13. Emergency Service Water System (Subsection 2.3.3.13)
14. Component Cooling Water System (Subsection 2.3.3.14)
15. Waste Processing Building Cooling Water System (Subsection 2.3.3.15)
16. Essential Services Chilled Water System (Subsection 2.3.3.16)
17. Non-Essential Services Chilled Water System (Subsection 2.3.3.17)
18. Emergency Screen Wash System (Subsection 2.3.3.18)
19. Generator Gas System (Subsection 2.3.3.19)

20. Hydrogen Seal Oil System (Subsection 2.3.3.20)

21. Emergency Diesel Generator System (Subsection 2.3.3.21)

22. Diesel Generator Fuel Oil Storage and Transfer System (Subsection 2.3.3.22)

23. Diesel Generator Lubrication System (Subsection 2.3.3.23)

24. Diesel Generator Cooling Water System (Subsection 2.3.3.24)

25. Diesel Generator Air Starting System (Subsection 2.3.3.25)

26. Security Power System (Subsection 2.3.3.26)

27. Instrument Air System (Subsection 2.3.3.27)

28. Service Air System (Subsection 2.3.3.28)

29. Bulk Nitrogen Storage System (Subsection 2.3.3.29)

30. Hydrogen Gas System (Subsection 2.3.3.30)

31. Fire Protection System (Subsection 2.3.3.31)

32. Storm Drain System (Subsection 2.3.3.32)

33. Oily Drains System (Subsection 2.3.3.33)

34. Radioactive Floor Drains System (Subsection 2.3.3.34)

35. Radioactive Equipment Drains System (Subsection 2.3.3.35)

36. Secondary Waste System (Subsection 2.3.3.36)

37. Laundry and Hot Shower System (Subsection 2.3.3.37)

38. Upflow Filter System (Subsection 2.3.3.38)

39. Potable and Sanitary Water System (Subsection 2.3.3.39)

40. Demineralized Water (Subsection 2.3.3.40)

41. Filter Backwash System (Subsection 2.3.3.41)

42. Radiation Monitoring System (Subsection 2.3.3.42)

43. Oily Waste Collection and Separation System (Subsection 2.3.3.43)
44. Liquid Waste Processing System (Subsection 2.3.3.44)
45. Secondary Waste Treatment System (Subsection 2.3.3.45)
46. Boron Recycle System (Subsection 2.3.3.46)
47. Gaseous Waste Processing System (Subsection 2.3.3.47)
48. Radwaste Sampling System (Subsection 2.3.3.48)
49. Refueling System (Subsection 2.3.3.49)
50. New Fuel Handling System (Subsection 2.3.3.50)
51. Spent Fuel System (Subsection 2.3.3.51)
52. Spent Fuel Pool Cooling System (Subsection 2.3.3.52)
53. Spent Fuel Pool Cleanup System (Subsection 2.3.3.53)
54. Spent Fuel Cask Decontamination and Spray System (Subsection 2.3.3.54)
55. Spent Resin Storage and Transfer System (Subsection 2.3.3.55)
56. Containment Auxiliary Equipment (Subsection 2.3.3.56)
57. Containment Liner Penetration Auxiliary Equipment (Subsection 2.3.3.57)
58. Security Building HVAC System (Subsection 2.3.3.58)
59. Containment Vacuum Relief System (Subsection 2.3.3.59)
60. Bridge Crane Equipment (Subsection 2.3.3.60)
61. Containment Pressurization System (Subsection 2.3.3.61)
62. Penetration Pressurization System (Subsection 2.3.3.62)
63. Containment Cooling System (Subsection 2.3.3.63)
64. Airborne Radioactivity Removal System (Subsection 2.3.3.64)

65. Containment Atmosphere Purge Exhaust System (Subsection 2.3.3.65)
66. Control Rod Drive Mechanism Ventilation System (Subsection 2.3.3.66)
67. Primary Shield and Reactor Supports Cooling System (Subsection 2.3.3.67)
68. Fuel Cask Handling Crane System (Subsection 2.3.3.68)
69. Reactor Auxiliary Building Ventilation System (Subsection 2.3.3.69)
70. Emergency Service Water Intake Structure Ventilation System (Subsection 2.3.3.70)
71. Turbine Building Area Ventilation System (Subsection 2.3.3.71)
72. Waste Processing Building HVAC System (Subsection 2.3.3.72)
73. Diesel Generator Building Ventilation System (Subsection 2.3.3.73)
74. Fuel Oil Transfer Pump House Ventilation System (Subsection 2.3.3.74)
75. Fuel Handling Building Auxiliary Equipment (Subsection 2.3.3.75)
76. Fuel Handling Building HVAC System (Subsection 2.3.3.76)
77. Turbine Building Health Physics Room Auxiliary Equipment (Subsection 2.3.3.77)
78. Polar Crane Auxiliary Equipment (Subsection 2.3.3.78)
79. Elevator System (Subsection 2.3.3.79)
80. Technical Support Center HVAC System (Subsection 2.3.3.80)
81. Mechanical Components in Electrical Systems (Subsection 2.3.3.81)
82. Monorail Hoists Equipment (Subsection 2.3.3.82)
83. Post-Accident Hydrogen System (Subsection 2.3.3.83)

2.3.3.1 Chemical and Volume Control System

System Description

The Chemical and Volume Control System (CVCS) provides auxiliary services to the RCS. The CVCS maintains a programmed water level in the Pressurizer, thereby maintaining the required water inventory in the RCS, by means of the charging and letdown functions. Charging and letdown combine to form a continuous feed and bleed process. Reactor coolant is "letdown" to the CVCS from the RCS loop A crossover leg. The CVCS Volume Control Tank (VCT) provides a surge capacity for reactor coolant expansion not accommodated by the Pressurizer. Three CSI pumps are provided to take suction on the VCT and return the cooled, purified reactor coolant to the RCS. A portion of the charging flow is directed through a seal water injection filter and then to each RCP for seal water injection.

The CVCS provides RCS water chemistry control, including addition and removal of pH control chemicals, control of oxygen concentration, and removal of corrosion and fission products. The CVCS is also used for the addition and removal of boric acid and makeup water at concentrations and rates compatible with all phases of plant operation and provides the ability to emergency borate the RCS in the event of an unplanned addition of positive reactivity.

The CSI pumps also serve as the HHSI pumps in the ECCS. During a postulated LOCA, the CVCS is isolated except for the CSI pumps and the piping in the flow paths for safety injection and RCP seal injection.

For refueling and maintenance, the RCS is drained to the recycle holdup tank via the CVCS letdown line. Following refueling and maintenance, the CSI pumps are used to refill the RCS with purified reactor coolant at the desired blended boron concentration. The CVCS is used as a means to provide makeup to the RWST.

Portions of the CVCS support the RCPB function.

The CVCS includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The CVCS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The CVCS meets the scoping criteria for Fire Protection, EQ, and SBO.

Based on the above discussion, the CVCS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Maintains RCP seal injection flow, • Controls RCS water chemistry conditions, activity levels, boron concentration, and coolant inventory makeup, • Supports the ECCS function for HHSI, • Provides a means to provide makeup to the RWST, • Contains components that provide the RCPB function, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The CVCS System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The CVCS System is described in detail in HNP FSAR Section 9.3.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CVCS System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0801-LR	5-G-0803-LR	5-G-0804-LR
5-G-0805-LR	5-G-0806-LR	5-G-0807-LR
5-G-0817-LR	5-G-0829-LR	

Components Subject to Aging Management Review

The table below identifies the CVCS System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System.

TABLE 2.3.3-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CHEMICAL AND VOLUME CONTROL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Backflushable Filters	M-1 Pressure-Boundary M-2 Filtration
Boric Acid Transfer Pumps	M-1 Pressure-Boundary
Charging and Safety Injection Pump Gear Lube Oil Pumps	M-1 Pressure-Boundary
Charging Pump Mini-Flow Orifices	M-1 Pressure-Boundary M-3 Throttle
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Charging and Safety Injection Pump Lube Oil Pumps	M-1 Pressure-Boundary
Charging and Safety Injection Pumps	M-1 Pressure-Boundary
Charging and Safety Injection Pumps Gear Oil Cooler Components	M-1 Pressure-Boundary
Charging and Safety Injection Pumps Gear Oil Cooler Tubes	M-5 Heat Transfer
Charging and Safety Injection Pumps Oil Cooler Components	M-1 Pressure-Boundary
Charging and Safety Injection Pumps Oil Cooler Tubes	M-5 Heat Transfer
Charging and Safety Injection Pumps Lube Oil Piping Components	M-1 Pressure-Boundary
Excess Letdown Heat Exchanger Components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Letdown Heat Exchanger Components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Regenerative Heat Exchanger	M-1 Pressure-Boundary
Seal Water Heat Exchanger Components	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration
Tank Diaphragm	M-4 Structural Support
Tanks	M-1 Pressure-Boundary
Volume Control Tank	M-1 Pressure-Boundary

2.3.3.2 Boron Thermal Regeneration System

System Description

The Boron Thermal Regeneration System (BTRS) includes compressors, coolers, demineralizers, heat exchangers, pumps, valves and piping, and was designed to vary the RCS boron concentration during reactor power changes and assists in making RCS boron concentration changes associated with fuel depletion, shutdowns, start-ups, and refueling.

The BTRS utilizes a temperature-dependent ion exchange process in order to store and release boron from the RCS without discharging water to the Boron Recycle System. The BTRS was originally designed to control the changes in reactor coolant boron concentration to compensate for the xenon transients during load follow operations without adding makeup for either boration or dilution. The BTRS is not currently used at HNP to adjust the RCS boron concentration to compensate for xenon transients during load follow operations. The BTRS is used towards the end of core life to reduce the boron concentration of the reactor coolant.

All components in the BTRS, except for those in the chilled water loop, have been classified as nuclear safety related. The BTRS is required to maintain the CVCS pressure boundary.

The BTRS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the BTRS provides the following system intended functions:

10 CFR54.4(a)(1) Functions	• Required to maintain the CVCS pressure boundary.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The BTRS is in the scope of License Renewal, because it contains:

1. Components that are classified as safety related, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The BTRS is described in detail in HNP FSAR Sections 9.3.4.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the BTRS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0804-LR 5-G-0806-LR

Components Subject to Aging Management Review

The table below identifies the BTRS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Boron Thermal Regeneration System.

TABLE 2.3.3-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: BORON THERMAL REGENERATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
BTRS Chiller Lube Oil Cooler	M-1 Provide pressure-retaining boundary
Closure bolting	M-1 Provide pressure-retaining boundary
Letdown Chiller Heat Exchanger Components	M-1 Provide pressure-retaining boundary
Letdown Reheat Heat Exchanger Components	M-1 Provide pressure-retaining boundary
Moderating Heat Exchanger Components	M-1 Provide pressure-retaining boundary
Piping, piping components, and piping elements	M-1 Provide pressure-retaining boundary
Tanks	M-1 Provide pressure-retaining boundary

2.3.3.3 Primary Makeup System

System Description

Primary Makeup System is designed to supply makeup water to various systems including the CVCS, Boron Recycle System, Spent Fuel Pool Cooling, Spent Fuel Pool Cleanup, Filter Backwash System, Liquid Waste Processing System, Gaseous Waste Processing System, and the Pressurizer System.

The Primary Makeup System provides storage and distribution of recycled, demineralized water which, due to previous use within other plant systems, has some tritium content. This system provides an emergency water makeup source for the CCW System and also provides a sufficient reserve supply of makeup water to the CVCS to maintain a constant RCS pressurizer level during a cooldown to cold shutdown conditions. The system also provides water to non-safety related systems in the RAB during normal operation. The Primary Makeup System consists of the Reactor Makeup Water Storage Tank (RMWST), two Reactor Makeup Water Pumps, flow orifices, strainers, and associated valves and piping.

The RMWST serves as the head tank for the Primary Makeup System. Makeup to the RMWST is supplied by the Demineralized Water System.

The Primary Makeup System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The RWMST level transmitters are included in the EQ Program.

Based on the above discussion, the Primary Makeup System performs the following system intended functions.

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ.

The Primary Makeup System is in the scope of License Renewal, because it contains:

1. Components that are classified as safety related,
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and
3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Primary Makeup System is described in HNP FSAR Section 9.2.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Primary Makeup System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0052-LR	5-G-0299-LR	5-G-0806-LR
5-G-0811-LR	5-G-0814-LR	5-G-0829-LR

Components Subject to Aging Management Review

The table below identifies the Primary Makeup System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-3 Auxiliary Systems - Summary of Aging Management Evaluation – Primary Makeup System.

TABLE 2.3.3-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRIMARY MAKEUP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Flow restricting elements	M-1 Pressure Boundary M-3 Throttle
Piping, piping components, and piping elements	M-1 Pressure Boundary
Reactor Makeup Water Storage Tank	M-1 Pressure Boundary
Tank Diaphragm	M-4 Structural Support

2.3.3.4 Primary Sampling System

System Description

The Primary Sampling System (PSS) is designed to collect fluid and gas grab samples while minimizing the radiation exposure to personnel. These samples can be taken from RCS Loop 2 or 3 hot leg, the pressurizer liquid or vapor space, and the RCS support systems. The RCS support systems include the BTRS, the CVCS, the RHR System, the SI System accumulators, and the RMWST. These samples provide the information needed to maintain RCS chemistry and to control chemistry parameters during normal plant operational modes. The PSS includes the equipment skids, coolers, compressors, pumps, panels, tanks, sample sinks, and associated piping and tubing.

The PSS consists of two wet sample panels and one dry panel. One wet panel is used to obtain high temperature, high-pressure samples from the RCS, the SI System and the Steam Generator Blowdown System. The other wet panel is used to obtain low temperature, low pressure grab samples from the CVCS, Boron Recycle System, and the BTRS. A dry panel is used to house the electrical equipment including recorders, indicators, and annunciators. Sample points from steam generator blowdown are located in the reactor coolant sample panel because of the possibility of radioactive contamination due to primary-to-secondary leakage. The Demineralized Water System provides water for flushing and cleaning of the Primary Sample Panel sink.

The PSS is used to determine fission and corrosion product activity levels, boron concentration, lithium, pH and conductivity levels, radiation levels, crud concentration, dissolved gas concentration and chloride concentration, and gas compositions in various tanks. The results of the analysis are used to regulate boron concentration, monitor fuel rod and steam generator tube integrity, specify chemical additions to the various systems and maintain proper hydrogen and nitrogen overpressure in the VCT.

The PSS is required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The PSS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The PSS meets the scoping criteria for environmental qualification and station blackout.

Based on the above discussion, the PSS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ and SBO.

The PSS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The PSS is described in HNP FSAR Section 9.3.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the PSS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0052-LR 5-G-0814-LR

Components Subject to Aging Management Review

The table below identifies the PSS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Sampling System.

TABLE 2.3.3-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRIMARY SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Containment isolation piping and components	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
Primary Sampling Condenser Components	M-1 Pressure Boundary
Primary Sampling Condenser Tubes	M-5 Heat Transfer
Primary Sampling Cooler Components	M-1 Pressure Boundary

TABLE 2.3.3-4 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRIMARY SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Primary Sampling Cooler Tubes	M-5 Heat Transfer
Primary Sampling Evaporator Components	M-1 Pressure Boundary
Primary Sampling Evaporator Tubes	M-5 Heat Transfer

2.3.3.5 Post-Accident Sampling System

System Description

The Post Accident Sampling System (PASS) is designed to collect and analyze fluid samples and to provide grab samples for additional analysis in the event of a LOCA. Samples can be taken from the RCS Loop 2 or Loop 3 hot legs or from either RHR pump discharge line. The former sample points provide a reactor coolant sample; the latter, a containment sump sample. The PASS has been designed to provide for an undiluted and diluted liquid grab sample and a diluted gas grab sample in accordance with Regulatory Guide 1.97, Category 3, and NUREG-0737, "Clarification of TMI Action Plan Requirements." The PASS comprises a sample preparation skid, a gas separation skid, an analysis skid, and a control panel skid. PASS contains associated piping, instrumentation, chillers, flow elements, pumps, sample cylinders, and tanks.

The PASS sampling equipment is isolated from the RCPB and the containment and is, therefore, non-nuclear safety class and is not designed to seismic Category I requirements. However, the system includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1, requirement.

The PASS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The PASS includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification.

Based on the above discussion, the PASS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ.

The PASS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The PASS is described in HNP FSAR Section 9.3.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the PASS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0052-LR 5-G-0105-LR

Components Subject to Aging Management Review

The table below identifies the PASS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Post Accident Sampling System.

TABLE 2.3.3-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: POST ACCIDENT SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.6 Circulating Water System

System Description

The Circulating Water System (CWS) provides the main condenser with a continuous supply of cooling water for removing the heat rejected by the main turbines. The water is circulated through the condenser from the cooling tower basin. A concrete canal directs water from the cooling tower basin to the inlet of the CWS Pumps located in the Circulating Water Intake Structure. The CWS is equipped with three vertical wet pit pumps that take suction from the Circulating Water Intake Structure and discharge water through individual steel pipes into the CWS Pump discharge header. Two 120 in. diameter reinforced concrete pipes carry the water from this distribution header to the Turbine Building (TB). Inside the TB, two concrete pipes connect to steel pipes that carry water to each of the two condenser inlet water boxes. Warm water from the condenser is returned via steel pipes and reinforced concrete pipes to the Cooling Tower (CT). The concrete pipes discharge to the hot water distribution system of the CT. Concrete was selected as the piping material to be used for the underground distribution headers in the yard.

The CWS is designed to operate continuously throughout the year under various ambient weather conditions. In addition, the CWS serves as the preferred heat sink for normal reactor cooldown to 350EF, but has no safety function. The system is not required to operate during design basis accidents.

The CWS includes components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48) because of its interface with the Normal Service Water (NSW) System. The NSW system is credited for fire protection. During normal operation, the NSW return flow paths from branch headers, with the exception of the Waste Processing Building (WPB) return, discharge into the CWS return lines in the TB north of the main condenser. The NSW return flow from the WPB joins the CWS lines in the yard between the TB and the CT. In the NSW return path to the CT, the flow path in scope for License Renewal includes the return flow path from the outlet of the RAB to the CT basin via the CT sprays. The in-scope piping components will extend in the CWS return paths to the branch isolation valves from other return lines, e.g., condenser discharge valves and WPB and TB NSW return flow valves.

The CWS has several non-safety related electrical components in the RAB that are evaluated for seismic interactions with nearby safety related equipment. The system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal. Therefore, The CWS contains electrical components that have potential, adverse spatial interactions with safety related equipment.

Based on the above discussion, the CWS performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The CWS is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

2. Components that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The CWS is described in HNP FSAR Section 10.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CWS are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0047-LR 5-G-0048-LR

<u>Components Subject to Aging Management Review</u>

The table below identifies the CWS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Circulating Water System.

TABLE 2.3.3-6 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CIRCULATING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.7 Cooling Tower System

System Description

The Cooling Tower (CT) System is part of the CWS. The CT System is designed to operate continuously throughout the year under various ambient weather conditions. In addition, the system serves as the preferred heat sink for reactor cooldown under normal conditions. The CT System consists of the CT structure and mechanical and electrical components used for its maintenance and operation, e.g. spray nozzle, deicing gate valves, manual slide gate valves, bypass valves, and lighting. The CT Structure is described in Subsection 2.4.2.6.

The systems interfacing with the CT are the NSW System, the CT Make-up System, the CT Blowdown System, and the CT Water Treatment System. The NSW System is supplied by cool water from the CT Basin and returns its warm water to the CT basin via the CT sprays. The CT Make-up System and the CT Blowdown System are used to maintain circulating water inventory using the Main Reservoir. The CT Water Treatment System injects chemicals into the CT Basin to control biofouling of the condenser tubes.

The CT Basin serves as the source of water for both the CWS and the NSW Systems. The loss of the CT System as a heat sink for the main condenser will result in a plant trip.

The CT System includes components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The NSW System is credited for fire protection following postulated fires when the Emergency Service Water (ESW) System is unavailable. The CT System contains the valves, headers, and spray nozzles located in the CT.

Based on the above discussion, the CT System has the following system intended functions for License Renewal:

10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The CT System is in the scope of License Renewal, because it contains:

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The CT System is described in HNP FSAR Section 10.4.5.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CT System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0048-LR

Components Subject to Aging Management Review

The table below identifies the CT System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Cooling Tower System.

TABLE 2.3.3-7 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: COOLING TOWER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Spray Nozzles	M-8 Spray Pattern

2.3.3.8 Cooling Tower Make-Up System

System Description

The Cooling Tower Make-Up (CTMU) System is considered to be a part of the CWS. The CTMU System replaces the loss of water inventory from the CT caused by natural evaporation, drift, and blowdown requirements. The CTMU Pump supplies water from the Main Reservoir to the CT Basin. One CTMU Pump and one standby are provided. The two CTMU Pumps are located in Bays B and C of the Emergency Service Water and Cooling Tower (ESW &CT) Makeup Intake Structure. These non-safety related components cannot affect the function of the safety related equipment in Bay 6 and Bay 8 due to the reinforced concrete enclosures surrounding Bay 6 and Bay 8. One of the two pumps is sufficient to supply the amount of make-up water required for the CWS.

CTMU System water flow is controlled by means of a level control valve in the makeup line that keeps the water level constant at the selected setpoint in the CT Basin. This level control valve also serves to control the CT Blowdown System flow rate, by changing the water level setpoint in the CT basin.

Debris from the make-up water is reduced by the traveling screens installed in the ESW & CT Make-Up Intake Structure. In addition the self-cleaning strainers installed at the CT make-up pump discharges, prevent small debris from entering the system.

The CTMU System includes components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The CTMU System discharge piping forms a pressure boundary with the concrete conduit (pipe) between the CT Basin and the ESW &CT Makeup Intake Structure. The NSW System which takes water from the CT Basin is credited for fire protection following postulated fires that render the ESW System unavailable.

Based on the above discussion, the CTMU System has the following system intended functions for License Renewal:

10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The CTMU System is in the scope of License Renewal, because it contains:

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The CTMU System is described in HNP FSAR Section 10.4.5.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CTMU System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0048-LR

Components Subject to Aging Management Review

The table below identifies the CTMU System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Cooling Tower Make-Up System.

TABLE 2.3.3-8 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: COOLING TOWER MAKE-UP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.9 Screen Wash System

System Description

Screen wash capability is provided to traveling screens associated with the CT Makeup System, ESW System, and Fire Protection Water System. The purpose of the traveling screens is to remove debris from the suction of pumps which deliver raw water from the main and auxiliary reservoirs. Screen wash spray keep the screens clear to ensure continued availability of water to the suction of the associated pumps. The screens rotate as required to present clear sections through which water flows to the pump suction. As the screens rotate, screen wash water is sprayed through nozzles to remove debris. This subsection discusses the non-safety related Screen Wash System that provides screen wash water to the cooling tower makeup (CTMU) pump screens and the fire service water pump screens. The Emergency Screen Wash System is discussed in Subsection 2.3.3.18.

The Screen Wash System is a non-safety related system with most of its components located in the ESW Screening Structure and the ESW &CT Makeup Intake Structure. The CTMU screen wash pump is located in the ESW & CT Makeup Intake Structure, and fire service screen wash pumps A and B are located in the ESW Screening Structure. During normal service water operation, the CTMU screen wash pump supports operation of the CTMU System pumps. In off normal conditions, the CTMU screen wash pump can be connected to provide a backup supply of screen wash water to the ESW traveling screens and to one of the Fire Protection System traveling screens. During normal operation, fire service screen wash pumps A and B are available and can be connected to service the diesel-driven fire pump in Bay 1 and the motor-driven fire pump and jockey pump in Bay 8 of the ESW Screening Structure.

The Screen Wash System has a few components classified as safety related. The fire service screen in Bay 1 of the ESW Screening Structure has a traveling screen motor and gear box and backup supply piping that are classified as safety related; however, the associated screens and fire pump are non-safety related. These safety related components are not relied upon to remain functional during and following design basis events. They are relied upon to remain functional during a fire with a concomitant loss of offsite power. Because the components are required to function to perform a fire protection function, 10 CFR 54.4, Criterion (a)(1), does not apply.

The Screen Wash System is designed to operate outdoors. The system piping that is exposed to the outdoor elements, are heat traced and insulated. The housing for each screen has electric heaters for freeze protection.

The Screen Wash System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Screen Wash System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Screen Wash System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The Screen Wash System is described in HNP FSAR Section 9.2.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Screen Wash System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0308-LR

Components Subject to Aging Management Review

The table below identifies the Screen Wash System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Screen Wash System.

TABLE 2.3.3-9 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SCREEN WASH SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Fire Service Screen Wash Pumps	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.10 Main Reservoir Auxiliary Equipment

System Description

The Main Reservoir Auxiliary Equipment contains civil, mechanical, and electrical components. The civil components such as structural elements of the dam are evaluated as civil structures. The mechanical and electrical components include electrical meters, monitors, level elements, and circuit breakers. These components are located in the ESW & CT Makeup Intake Structure and are used to monitor the water level in the Main Reservoir.

The source of normal cooling water for the plant is the non-safety related CT; the sources of emergency cooling water are the Main or Auxiliary Reservoirs. The preferred source of emergency cooling water is the Auxiliary Reservoir, if the CT or its associated components are not available. The backup source of emergency service water is the Main Reservoir if the Auxiliary Reservoir is not available.

In the Ultimate Heat Sink (UHS) analysis, a Main Reservoir level of 205.7 ft. is used as the starting point to determine final UHS temperature and level and if an adequate volume of water exists to remove the heat generated by the plant. However, to ensure the flow requirements for safety related heat exchangers cooled by ESW are met, the UHS minimum Main Reservoir level is 215 ft. HNP Technical Specifications require the UHS to be operable with a minimum Main Reservoir water level at or above 215 ft. mean sea level.

The Main Reservoir mechanical and electrical components are used to provide main reservoir water level indication. These components have been evaluated as not meeting the criteria for inclusion in the scope of License Renewal as safety related, 10 CFR 54.4(a)(1). However, they have been conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality classification because they are used to maintain the initial conditions for water level in the Main Reservoir.

Based on the above discussion, the Main Reservoir performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Main Reservoir is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Main Reservoir is described in HNP FSAR Sections 2.4.11.6, 2.4.11.7, and 9.2.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Main Reservoir are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0308-LR

Components Subject to Aging Management Review

The mechanical and electrical components that are in scope for License Renewal were determined to be active; therefore, no mechanical or electrical components require aging management review. The components that are subject to AMR consist of civil structures and commodities; these are addressed in Section 2.4.

2.3.3.11 Auxiliary Reservoir Auxiliary Equipment

System Description

The Auxiliary Reservoir Auxiliary Equipment includes civil, mechanical and electrical components. The civil components, such as structural elements of the dam, are evaluated as civil structures. The mechanical and electrical components include level elements and transmitters. These components are located in the ESW Screening Structure and are used to monitor the water level in the Auxiliary Reservoir.

The source of normal cooling water for the plant is the non-safety related CT; the sources of emergency cooling water are the Main or Auxiliary Reservoirs. The preferred source of emergency cooling water is the Auxiliary Reservoir, if the CT or its associated components are not available. The backup source of ESW is the Main Reservoir if the Auxiliary Reservoir is not available.

The Auxiliary Reservoir is completely isolated from the Main Reservoir. A minimum level of 250 ft. elevation in the Auxiliary Reservoir is maintained at all times during normal operation by creek inflow above the Auxiliary Dam and by pumping water from the Main Reservoir. HNP Technical Specifications require the ultimate heat sink to be operable with a minimum Auxiliary Reservoir water level at or above elevation 250 ft. mean sea level.

The Auxiliary Reservoir mechanical and electrical components are used to provide Auxiliary Reservoir level indication. These components have been evaluated as not meeting the criteria for inclusion in the scope of License Renewal as safety related, 10 CFR 54.4(a)(1). However, they have been conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality classification because they are used to maintain the initial conditions for water level in the Auxiliary Reservoir..

Based on the above discussion, the Auxiliary Reservoir performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Auxiliary Reservoir is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Auxiliary Reservoir is described in HNP FSAR Sections 2.4.11.7 and 9.2.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Auxiliary Reservoir are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0308-LR

Components Subject to Aging Management Review

The mechanical and electrical components that are in scope for License Renewal were determined to be active; therefore, no mechanical or electrical components require aging management review. The components that are subject to AMR consist of civil structures or commodities; these are addressed in Section 2.4.

2.3.3.12 Normal Service Water System

System Description

The FSAR describes the Service Water System (SWS) as consisting of components in the following systems:

- Normal Service Water (NSW) System
- Emergency Service Water (ESW) System
- Emergency Screen Wash (ESWSW) System

This subsection addresses the NSW System. The NSW pumps take suction from the CT basin. The heated service water is returned to the CT via the CWS return pipes. The NSW System is designed to operate continuously during normal, and shutdown operating modes. The NSW System functions to:

1. Provide cooling water at a maximum temperature of 95°F to remove plant heat loads by utilizing the CT and associated components during normal and shutdown operation;

2. Provide for detecting, controlling, and isolating radioactive leakage into and out of the system.

Two 100-percent capacity NSW pumps are provided. During Unit start-up, shutdown, and normal operation, SW requirements will be met by one of the NSW pumps. The pump furnishes all normal operating SW requirements for the Unit through a single supply line. NSW removes plant heat loads from auxiliary components associated with the primary and secondary systems and miscellaneous building services during normal plant operation. Waste heat from these sources is dissipated in the plant CT. The NSW System provides all cooling water requirements to the ESW System during normal operating modes.

The piping and components of the NSW System up to and returning from the isolation valves which separate the ESW header from the NSW header are not designated nuclear safety class or Seismic Category I. The non-Seismic Category I, non-safety class portion of the NSW System is not considered available during accident and emergency conditions, and no credit is taken in the safety evaluation for this portion of the system.

CT makeup flow and CT basin flow combine to provide water below the maximum design temperature of 95ºF before return to the NSW System. Makeup for CT evaporative losses and blowdown is provided from the Main Reservoir by means of makeup pumps. When operable, the CT can provide cooling water for Unit shutdown without reliance on the Main or Auxiliary Reservoirs. During shutdown, the CT evaporative losses are sufficiently low so that makeup to the CT will not be required.

The portion of the NSW System that services the non-safety containment coolers contains safety related piping and electrical components associated with the containment isolation function. An SIS initiates closure of these NSW isolation valves and isolates the non-safety containment coolers. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The NSW System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The NSW System includes electrical and mechanical components associated with containment isolation that are required to perform in a harsh environment during accident conditions or are required to perform during an SBO event.

The NSW System includes components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The NSW System is credited for fire protection when the ESW System cannot supply at least one of the two trains of shutdown equipment. To support this requirement, the NSW System takes suction from the CT basin and supplies flow to the ESW headers in the RAB and returns water to the CT basin via the CT sprays.

Based on the above discussion, the NSW System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Supports functions associated with fire protection, EQ, and SBO.

The NSW System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The NSW System is described in HNP FSAR Section 9.2.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the NSW System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0047-LR 5-G-0048-LR 5-G-0436-LR

Components Subject to Aging Management Review

The table below identifies the NSW System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-10 Auxiliary Systems - Summary of Aging Management Evaluation – Normal Service Water System.

TABLE 2.3.3-10 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NORMAL SERVICE WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure Boundary
Closure bolting	M-1 Pressure Boundary
Containment isolation piping and components	M-1 Pressure Boundary
Normal Service Water Pumps	M-1 Pressure Boundary
Normal Service Water Seal & Bearing Water Booster Pump	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure Boundary

2.3.3.13 Emergency Service Water System

System Description

The FSAR describes the Service Water System (SWS) as consisting of components in the following systems:

- Normal Service Water (NSW) System
- Emergency Service Water (ESW) System
- Emergency Screen Wash (ESWSW) System

This subsection addresses the ESW System.

HNP has two ESW pumps located in dedicated bays in the ESW & CT Makeup Intake Structure. Each pump discharges into a separate pipeline. From the pumps, water passes through a self-cleaning strainer and to the various loads. Water is then supplied to the redundant loops and to the ESW Screen Wash System. Each redundant loop contains a booster pump. Under emergency operation, the booster pumps start; and the containment fan cooler orifice bypass valves shut. These automatic actions serve to maintain ESW pressure in piping and cooling coils that serve the safety related containment coolers above the containment design pressure.

During normal operation, the NSW System provides all service water requirements including ESW loads. During accident conditions, the ESW System pumps circulate water from the Ultimate Heat Sink (UHS), through plant components required for safe shutdown of the reactor following an accident, and back to the UHS. The ESW System performs its cooling function following a postulated LOCA or loss of off-site power, automatically and without operator action. Redundancy built into the system provides protection from a single active or single passive failure.

The ESW System flow path operates continuously during normal, and shutdown operating modes. It is designed to:

1. Provide cooling water at a maximum temperature of 95°F to remove essential plant heat loads by utilizing the Auxiliary Reservoir or its backup, the Main Reservoir, during emergency operation;
2. Isolate non-essential cooling loads from essential cooling loads during conditions which could otherwise compromise the system safety function:
3. Provide a heat sink for essential loads assuming a single active or passive component failure;
4. Withstand or be protected from the effects of a safe shutdown earthquake, a design basis tornado, maximum flood levels, or a high energy line break without loss of safety function:
5. Provide essential cooling services assuming a loss of offsite power in conjunction with any event in items 3 or 4;
6. Allow periodic testing and inspection of equipment to assure system integrity and capability;
7. Provide for detecting, controlling, and isolating radioactive leakage into and out of the system; and,
8. Provide a supply of water to the Auxiliary Feedwater System in the event of loss of the Condensate Storage Tank.

The ESW booster pumps will also provide the water supply for the Fire Protection Standpipe and Hose System following a seismic event.

The ESW pumps with associated piping and valves, and two redundant loops serving the essential plant components are designed to Seismic Category I requirements. All other parts, including the NSW System will be automatically isolated during emergency operation by valves located in the Seismic Category I piping. The non-Seismic Category I, non-safety class portion of the NSW System is not considered available during emergency operation, and no credit is taken in the safety evaluation for this portion of the system.

Those portions of the SWS piping in the ESW Screening Structure and ESW & CT Makeup Intake Structure which are exposed to the outdoor elements are heat traced and insulated. Since the heat tracing is required only to maintain the essential portions of the SW System in a condition of readiness prior to system use, the heat tracing is not safety related nor is it connectable to the on-site emergency power supply. The ESW System has underground piping from, the ESW Screening Structure to the ESW & CT Makeup Intake Structure and from the ESW &CT Makeup Intake Structure to the RAB-1, and to and from the Diesel Generator Building via the Diesel Generator Service

Water Pipe Tunnel under the TB. Return water from the RAB and Diesel Generator Building flows via underground piping to the ESW Discharge Structure.

The ESW System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The ESW System includes electrical and mechanical components associated with containment isolation that are required to perform in a harsh environment during accident conditions.

The ESW System is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for Fire Protection.

Based on the above discussion, the ESW System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, • Supports post-accident monitoring, • Provides cooling water to remove heat from essential plant components during design basis events, and • Provides a backup source of water for the Auxiliary Feedwater System.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Supports functions associated with fire protection and EQ.

The ESW System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The ESW System is described in HNP FSAR Section 9.2.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the ESW System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0047-LR 5-G-0052-LR 5-G-0436-LR

Components Subject to Aging Management Review

The table below identifies the ESW System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Service Water System.

TABLE 2.3.3-11 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Emergency Service Water Pumps	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.14 Component Cooling Water System

System Description

The Component Cooling Water (CCW) System provides cooling water to various plant safety related and non-safety related components during all phases of plant operation and shutdown. The system serves as an intermediate system between the RCS and the ESW and NSW Systems. The CCW System supports the ECCS, by removing heat from water being recirculated from the Containment Building sump to the reactor, and provides cooling water to safeguards pumps, in support of ESF functions.

The system consists of two CCW Heat Exchangers, three CCW Pumps, a CCW Surge Tank, cooling lines to the various components being cooled, and associated piping, valves and instrumentation. CCW flows from the pumps, through the shell side of the CCW Heat Exchangers, through the components being cooled, and back to the pumps.

The CCW System provides cooling for redundant essential CCW loops and a nonessential CCW loop. Each of the two essential loops consists of the one RHR Heat Exchanger and one RHR Pump Oil Cooler. The nonessential loop consists of the following:

1. One CVCS Letdown Heat Exchanger,
2. One CVCS Seal Water Heat Exchanger,
3. Two Spent Fuel Pool Heat Exchangers,
4. One Boron Recycle Evaporator Package,
5. Three RCP packages, each consisting of one Upper Bearing Lube Oil Cooler, One Lower Bearing Oil Cooler, and one Thermal Barrier Cooler,
6. One Gross Failed Fuel Detector Cooler,
7. One CVCS Excess Letdown Heat Exchanger,
8. One Reactor Coolant Drain Tank Heat Exchanger, and
9. Six PSS Sample Coolers.

The CCW surge tank is connected to the suction side of the CCW pumps. It accommodates surges resulting from CCW thermal expansion and contraction and accommodates water which may leak into the system from components that are being cooled. The CCW System receives water from the Demineralized Water System for the initial fill and makeup during system operation. The Reactor Makeup Water System provides an emergency supply of makeup water.

During power generation, hot standby, and shutdown conditions, one or two pumps operate to supply essential and non-essential CCW loads. The CCWS headers are cross-connected so one pump can supply all required loads during power operation, with one pump in standby. During normal operation, at least one CCW pump is supplying cooling water to safeguard pumps. The activation of an SIS will automatically start a second pump, thereby ensuring the continued operation of at least one CCW pump operating during the injection phase of safety injection. Before the initiation of the ECCS recirculation phase, the second CCW pump is started and the four motor-operated valves that cross-connect the two trains are closed by operator action from the control room. All four motor operated valves are initially closed to establish the design CCW flow rate to the RHR heat exchangers. During the recirculation phase, two of the four motor operated valves must remain closed in order to ensure train separation. One pair of valves can be opened to re-establish CCW flow to the nonessential loop in order to provide cooling to the spent fuel pools.

The CCW System headers to the RCPs and to the Excess Letdown and Reactor Coolant Drain Tank Heat Exchangers inside Containment are provided with check valves and motor operated gate valves on the inlet lines and motor operated gate valves on the outlet lines. These valves close on a Containment Isolation Signal (CIS). For protection in the unlikely event of a ruptured thermal barrier cooling coil in the RCP, each of the CCW lines to the pump thermal barriers is provided with check valves and the discharge header is provided with a third motor operated gate valve that would close automatically on high discharge flow.

The system contains valves that perform a containment isolation function. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The CCW System water flow to the non-safety process sampling system (i.e., sample heat exchangers and gross failed fuel detector) is provided with two air-operated valves on the inlet lines and two check valves on the outlet lines. The air operated valves on the inlet lines will close automatically on an SIS thus isolating the CCW System from non-safety related systems.

Water chemistry control of the CCW System is accomplished by additions to the chemical addition tank or to the surge tank.

The CCW System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The system is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for Fire Protection. In addition to supplying heat removal from essential loads during a post-fire safe shutdown, CCW System flow is provided through the RCP thermal barrier.

The system is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ and SBO.

Based on the above discussion, the CCW System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides cooling water to remove heat from essential plant components during design basis events, • Provides cooling water to remove heat from the spent fuel pools, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Supports functions associated with fire protection, EQ and SBO.

The CCW System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The CCW System is described in HNP FSAR Section 9.2.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CCW System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0184-LR	5-G-0187-LR	5-G-0299-LR
5-G-0819-LR	5-G-0820-LR	5-G-0821-LR
5-G-0822-LR	5-G-0822 S01-LR	

Components Subject to Aging Management Review

The table below identifies the CCW System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System.

TABLE 2.3.3-12 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: COMPONENT COOLING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Component Cooling Water Heat Exchanger Components	M-1 Pressure-Boundary
Component Cooling Water Heat Exchanger Tubes	M-5 Heat Transfer
Component Cooling Water Pumps	M-1 Pressure-Boundary
Component Cooling Water Surge Tank	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.15 Waste Processing Building Cooling Water System

System Description

The Waste Processing Building (WPB) Cooling Water System provides cooling water to Waste Processing System (WPS) components during various modes of plant operation and shutdown. The WPB Cooling Water System also serves as an intermediate heat transfer system between the WPS and the NSW System. This reduces the probability of radioactive effluent leaking into the NSW System. The WPB Cooling Water System accomplishes this by transferring heat from WPS components to the two WPB Cooling Water System heat exchangers, which are cooled by water supplied from the NSW System. Only one cooling water pump and heat exchanger are required for operation.

The WPB Cooling Water System was originally designed to provide cooling water to the various WPS components listed below:

1. Waste gas compressors,
2. Catalytic recombiners,
3. Waste evaporators,
4. Reverse osmosis concentrate evaporators,
5. Reverse osmosis module precoolers,
6. Reverse osmosis module chillers (refrigeration unit),
7. Waste evaporator concentrate tank vent gas condensers,
8. Volume reduction condenser,
9. Secondary waste evaporators, and
10. Radiation monitors.

Currently, Items (4), (5), (6), and (7) and the "A" catalytic recombiner in Item (2) are in long-term shutdown. Items (8) and (9) above have been abandoned.

The WPB Cooling Water System surge tank is connected to the suction side of the two WPB Cooling Water System pumps. It accommodates surges resulting from coolant thermal expansion and contraction and accommodates water which may leak into the system from components that are being cooled. The surge tank also contains a volume of water to provide a supply of cooling water while a leaking cooling line is isolated. The surge tank water level is maintained automatically by a level control valve located in the makeup water supply from the Demineralized Water System. Water chemistry control of the WPB Cooling Water System is accomplished by additions to the chemical addition tank or to the WPB cooling water surge tank.

The WPB Cooling Water System is neither a nuclear safety class nor Seismic Category I system. This system is not considered available during accident and emergency conditions, and no credit is taken in the safety evaluation for post-accident operation.

The WPB Cooling Water System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the WPB Cooling Water System performs the following intended function:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The WPB Cooling Water System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The WPB Cooling Water System is described in HNP FSAR Section 9.2.10. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the WPB Cooling Water System are shown on the following scoping drawing. Specifically, the components of concern are in proximity of safety related Essential Chilled Water System piping near a WPB Cooling

Water System heat exchanger in the WPB. These are non-connected, non-safety related components that could adversely affect the function of safety related components due to spatial interaction. The system boundary shown on the drawing reflects the portion of the system located in the room that houses the safety related piping. (Scoping drawings have been submitted separately for information only.)

5-G-0876-LR

Components Subject to Aging Management Review

The table below identifies the WPB Cooling Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-13 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Processing Building Cooling Water System.

TABLE 2.3.3-13 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE PROCESSING BUILDING COOLING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.16 Essential Services Chilled Water System

System Description

The objective of the Essential Services Chilled Water System (ESCWS) is to provide chilled water to the cooling coils of air handling units for the following systems:

1. Control Room Area Ventilation System,
2. Reactor Auxiliary Building (RAB) Normal Ventilation System,
3. RAB Non-Nuclear Safety Ventilation Systems.
4. RAB ESF Equipment Cooling System.
5. RAB Switchgear Ventilation System,
6. RAB Electrical Equipment Protection Rooms Ventilation System, and
7. Spent Fuel Pool Pump Room Ventilation System.

The ESCWS is designed to supply a nominal 44EF chilled water to the cooling coils in the air handling units. The system is designed with sufficient redundancy to meet the single failure criteria, and the system is designed to meet Safety Class 3 and Seismic Category I requirements.

The ESCWS consists of two 100-percent capacity subsystems, A and B, with one operating and one in standby. Each subsystem consists of a package water chiller, an expansion tank, a makeup water system, a chemical addition tank, a chilled water pump and an independent piping system. The condenser section of the water chiller will be supplied with cooling water from the NSW System during normal plant operation and from the ESW System during emergency plant operation.

The expansion tank accommodates system volume changes, maintains positive pressure in the piping loop and provides a means for adding makeup water to the system. Makeup water to the tank is fed from the Demineralized Water System during normal operation; during post-accident conditions, the makeup water is fed from the ESW System. The water level in the tank is automatically maintained by a level switch. A chemical addition tank located in the system provides the necessary chemicals to prevent corrosion and scale buildup in the system.

The ESCWS is a safety related system. Non-essential portions of the ESCWS are automatically isolated from the essential portions upon receipt of an SIS.

The system is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for Fire Protection.

The ESCWS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The system includes electrical and mechanical components required to perform in a harsh environment during accident condition.

Based on the above discussion, the ESCWS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides chilled water to the cooling coils of safety related air handling units to support ventilation requirements of safety related components during design basis events.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The ESCWS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires,

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The ESCWS is described in HNP FSAR Section 9.2.8. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the ESCWS are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

8-G-0498 -LR
8-G-0498 S02-LR

8-G-0499-LR
8-G-0499 S02-LR

Components Subject to Aging Management Review

The table below identifies the ESCWS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Services Chilled Water System.

TABLE 2.3.3-14 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Essential Chilled Water Chiller Condenser Components	M-1 Pressure-Boundary
Essential Chilled Water Chiller Condenser Tubes	M-5 Heat Transfer
Essential Chilled Water Compressors Oil Cooler Components	M-1 Pressure-Boundary
Essential Chilled Water Compressors Oil Cooler Tubes	M-5 Heat Transfer
Essential Chilled Water System Chiller Cooler Components	M-1 Pressure-Boundary

TABLE 2.3.3-14 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Essential Chilled Water System Chiller Cooler Tubes	M-5 Heat Transfer
Essential Chilled Water System Condenser Service Water Recirculation Pump	M-1 Pressure-Boundary
Essential Chilled Water System Water Pumps	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, piping elements and tanks	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary
Tanks	M-1 Pressure-Boundary

2.3.3.17 Non-Essential Services Chilled Water System

System Description

The objective of the Non-Essential Services Chilled Water System (NESCWS) is to provide chilled water to the cooling coils of air handling units for the following non-safety related systems:

1. FHB Heating, Ventilation and Air Conditioning (HVAC) System for spent fuel pools and operating floor area.
2. WPB HVAC System.

The NESCWS supplies a nominal 44EF chilled water to the cooling coils in the air handling units. The system consists of two 50 percent package water chillers, an expansion tank, a chemical addition tank, two chilled water pumps arranged in parallel (one operating and one stand-by) and a piping system. The cooling water for the condenser section of the chillers is supplied from the NSW System.

The expansion tank provides positive suction head, accommodates system volume changes and provides means for adding makeup water to the system. Makeup water to the expansion tank is fed from the Fire Protection System. A chemical addition tank is provided to prevent corrosion and scale buildup in the system. Chemical addition is manual when it is required by periodic water analysis test.

The NESCWS is a non-safety related system and is not required to operate during accident conditions. Upon a loss of power, the NESCWS is shut down. The system performs no safety related function and is not relied on in the emergency operating procedures. The system has no impact on plant power production.

The NESCWS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the NESCWS performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The NESCWS is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The NESCWS is described in HNP FSAR Section 9.2.9. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the NESCWS are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0497 S01-LR

Components Subject to Aging Management Review

The table below identifies the NESCWS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Non-Essential Services Chilled Water System.

TABLE 2.3.3-15 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NON-ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.18 Emergency Screen Wash System

<u>System Description</u>

Screen wash capability is provided to traveling screens associated with the CTMU System, ESW System, and Fire Protection Water System. The purpose of the traveling screens is to remove debris from the suction of pumps which deliver raw water from the main and auxiliary reservoirs. Screen wash spray keep the screens clear to ensure continued availability of water to the suction of the associated pumps. The screens rotate as required to present clear sections through which water flows to the pump suction. As the screens rotate, screen wash water is sprayed through nozzles to remove debris. This subsection discusses the Emergency Screen Wash (ESWSW) System which includes the components that provide screen wash water to the Emergency Service Water (ESW) Pump Screens.

The ESWSW System screens support operation of the ESW System. During normal operation, the ESWSW System is in standby and operates in conjunction with the ESW System pumps. In addition, the system supports the operation of the Site Fire Protection System pumps in the ESW Screening Structure.

The discharge of the ESW System Pumps A and B supply water to the suction of ESWSW System pumps A and B, respectively. The ESWSW pumps boost the water pressure and discharge the water through ESW system discharge piping and nozzles to the screens in the ESW & CT Makeup Intake Structure and the ESW Screening Structure. The ESWSW pumps also supply water to the ESW System pump seals.

The ESWSW System is a safety related system with most of its components located in the ESW Screening Structure and the ESW & CT Makeup Intake Structure. A few components in the system are classified as non-safety related and located in the proximity of safety related equipment. The system contains buried piping from the ESW & CT Makeup Intake Structure to the ESW Screening Structure.

During normal plant operation, the traveling screens may be powered by the plant normal power system via the emergency buses. During a plant emergency the power to the traveling screens will be automatically connected to the emergency buses.

Provisions are made to control the buildup and size of debris and ice on the traveling screens by design of the screens and by providing an alarm on high differential pressure across the screens. Based on the design criteria specified for the traveling screens and the safeguards provided against debris buildup, collapse of the screens will not occur.

The ESWSW System, including the traveling screens, is designed to operate outdoors. The housing for each screen has electric heaters for freeze protection. Those portions of the system piping in the ESW Screening Structure and ESW & CT Makeup Intake Structure which are exposed to the outdoor elements are heat traced and insulated. Since the heat tracing is required only to maintain the essential portions of the system in a condition of readiness prior to system use, the heat tracing is not safety related nor is it connectable to the on-site emergency power supply. Failure of the heat tracing will be alarmed in the Radwaste Control Room.

The ESWSW System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The ESWSW System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection

Based on the above discussion, the ESWSW System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Supports operation of the ESW System for cooling essential plant loads during design basis events.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The ESWSW System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The ESWSW System is described in HNP FSAR Section 9.2.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the ESWSW System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0308-LR

Components Subject to Aging Management Review

The table below identifies the ESWSW System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Screen Wash System.

TABLE 2.3.3-16 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SCREEN WASH SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Emergency Service Water Screen Wash Pumps	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary M-8 Spray Pattern

2.3.3.19 Generator Gas System

System Description

The purpose of the Generator Gas System is to remove the heat produced in the generator windings and other electrical components during main generator operation. Because of its efficient heat transfer characteristics, hydrogen gas is circulated through the generator as the cooling medium. The system provides a supply system to admit hydrogen into the generator, and carbon dioxide for purging operations.

To remove heat that is generated, hydrogen gas is circulated throughout the generator. The hydrogen gas is then cooled by means of a heat exchanger that is supplied by Service Water.

Hydrogen circulation through the generator is obtained from an axial flow fan mounted on the turbine end of the generator rotor. The discharge of the fan is directed to the hydrogen cooler, where hydrogen gas is cooled. The gas passes through the hydrogen cooler duct and exits back into the generator housing at the exciter end of the generator. The cooled gas flow is then directed to various generator components. Cold gas enters open ends of vent tubes located in the stator coils (armature) and enters axial holes in the stator core. The gas cooling the stator and core passes from one end of the generator to the other through the vent tubes and axial holes. It is discharged at the turbine end where it again passes through the blower and cooler.

A hydrogen gas supply system provides the necessary valves and instrumentation for the introduction of hydrogen into the generator. A gas dryer is used to remove moisture from the hydrogen gas to prevent the accumulation of condensation inside the generator. A gas analyzer is supplied to continuously monitor the purity of the hydrogen gas inside the generator. Three liquid moisture detectors are used at low points in the generator to detect any accumulation of water or oil inside the generator. A water detector is also located on the inlet line to the gas dryer. Activation of a liquid detector would indicate a possible hydrogen cooler leak or a hydrogen oil seal failure.

The Generator Gas System contains non-safety related components mounted in the Main Control Board. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Generator Gas System performs the following system intended function:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs.

The Generator Gas System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

The system has non-safety related components located near safety related components that place the system within scope. The in-scope components are classified as seismically analyzed to avoid adverse interactions with safety related SSCs during an earthquake.

FSAR and Drawing References

The Generator Gas System is described in HNP FSAR Section 10.2.2.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Generator Gas System components that are in scope for License Renewal are non-safety related electrical components mounted near safety related components. No Scoping drawings are provided.

Components Subject to Aging Management Review

There are no mechanical components in this system that require AMR. The Generator Gas System components that are subject to AMR are supports for non-safety related electrical components mounted in the vicinity of safety related components. These supports are addressed as civil commodities in Section 2.4.

2.3.3.20 Hydrogen Seal Oil System

System Description

The Hydrogen Seal Oil System provides oil for gland seals on the generator rotor shaft for a gas-tight enclosure to prevent the escape of hydrogen cooling gas along the generator shaft. During normal operations the seal oil unit is always operating when hydrogen gas is in the generator. Oil is supplied to two annular grooves in the gland seal ring. From these grooves, the oil flows in both directions along the shaft through the clearance space between the shaft and the gland seal rings. As long as oil pressure in the circumferential groove exceeds the gas pressure in the machine, the seal will prevent the escape of hydrogen from the generator.

The purpose of having two feed grooves in the gland ring is to provide for separate hydrogen side and air side oil subsystems. This design prevents hydrogen contaminated oil from reaching the main lube oil system. Conversely, the design also keeps oil contaminated with air and moisture out of the generator. When the feed pressure in these two subsystems is properly balanced, there is little flow in the clearance space between the two feed grooves.

The air side seal oil pump normally supplies all oil pressure requirements to the air side of the hydrogen seals. The hydrogen side seal oil pump supplies oil pressure to the hydrogen side of the gland seals.

The Hydrogen Seal Oil System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

Based on the above discussion, the Hydrogen Seal Oil System performs the following system intended function:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Hydrogen Seal Oil System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

The system has non-safety related electrical components that place the system within scope of License Renewal. The components are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2).

FSAR and Drawing References

The Hydrogen Seal Oil System is described in HNP FSAR Section 9.3.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Hydrogen Seal Oil System components that are in scope for License Renewal are non-safety related electrical components that meet the 10 CFR 54.4(a)(2) criterion . No Scoping drawings are provided.

Components Subject to Aging Management Review

The Hydrogen Seal Oil System components that are subject to AMR are supports for non-safety related electrical equipment; these are addressed as civil commodities in Section 2.4.

2.3.3.21 Emergency Diesel Generator System

System Description

The Emergency Diesel Generator (EDG) System provides a reliable source of alternate power to the emergency 6.9 kilovolt (KV) buses for use in the event that normal sources of off-site power are not available. Each generator is capable of starting and carrying the maximum ESF loads required under postulated accident conditions. Each diesel generator unit can be started either manually for test or automatically. The diesel generators automatically start upon receipt of an Engineered Safety Features Actuation Signal (ESFAS), a low bus voltage as indicated by the bus undervoltage relays, or simulated accident signal. They are automatically connected to the bus through the generator output breaker upon either low or loss of bus voltage. Each diesel is also capable of supplying all power needed for the safe shutdown of the plant under design emergency situations.

The major components included in the EDG System are two, independent, diesel generators and associated controls, governor, alarms and annunciator, combustion air intake and exhaust sub-systems, and generator output transformers. The engine is a 16-cylinder, "V"-type, 4-stroke, turbocharged, after-cooled diesel engine. The combustion air intake and exhaust sub-system includes filters, silencers, expansion joints and piping.

Each 6900-V, 6500-kW EDG is functionally identical. The diesel generator ratings are sufficient to supply reliable power to all safety related loads in its respective division, as well as to those non-safety related loads which it is desirable to have manually loaded on the diesel generator. Each diesel generator is designed for fast starting and load acceptance, with a high degree of availability and reliability. The generators are open, self-ventilated, synchronous revolving field type with solid state excitation systems.

Physical separation and isolation have been maintained in the location and installation of equipment for redundant systems. Each diesel generator is housed in a separate concrete room in the Diesel-Generator Building.

Operation of the EDG System is one way to provide station power and terminate a postulated SBO event. No credit is taken for operation of an EDG as part of the coping strategy for SBO. Therefore, this system is not in the scope of License Renewal for an SBO event.

The system contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The system is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for Fire Protection.

Based on the above discussion, the EDG System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Supplies a reliable source of electrical power in the event normal off-site power is not available, • Automatically starts and provides electrical power to the ESF loads under postulated accident conditions, and • Provides electrical power needed for safe shutdown of the plant under design emergency conditions. .
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The EDG System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The EDG System is described in HNP FSAR Section 8.3.1.1.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the EDG System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the EDG System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Diesel Generator System.

TABLE 2.3.3-17 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY DIESEL GENERATOR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Diesel combustion air intake filter housings and silencers	M-1 Pressure-Boundary
Diesel combustion air intake piping, piping components, and piping elements	M-1 Pressure-Boundary
Diesel engine exhaust piping, piping components, and piping elements	M-1 Pressure-Boundary
Diesel engine governor oil cooler components	M-1 Pressure-Boundary
Diesel engine governor oil cooler tubes	M-5 Heat Transfer
Diesel engine turbocharger intercooler components	M-1 Pressure-Boundary
Diesel engine turbocharger intercooler tubes	M-5 Heat Transfer
Diesel Exhaust Silencers	M-1 Pressure-Boundary
Piping, piping components, and piping components	M-1 Pressure-Boundary

2.3.3.22 Diesel Generator Fuel Oil Storage and Transfer System

System Description

The function of the Diesel Generator Fuel Oil Storage and Transfer System (DGFOSTS) is to store, maintain, and supply fuel oil to the diesel generators as required for all modes of diesel generator operation during normal and abnormal site and plant conditions. The system consists of two separate, independent fuel oil supply subsystems, each serving one of the two EDG System diesel engines.

The major components in the storage and transfer portion of the DGFOSTS are located in the Diesel Fuel Oil Storage Tank Building and consist of the fuel oil storage tanks, transfer pumps, system controls and instrumentation, piping, valves and strainers. The fill and transfer piping components, including unloading station equipment, are next to the Fuel Oil Storage Tank Building, but are separate and outside of the building itself. The fuel oil storage tanks are integral portions of the building structure. Engine-mounted piping and components of the system consist of an engine driven fuel oil pump, a duplex strainer, an ejector system, an injector system, manifolds, and valves. The EDG System engines and associated fuel oil day tanks are located in the Diesel Generator Building.

Operation of the fuel oil transfer pump is either manual or automatic in response to sensed level in the associated day tank. Day tank level instrumentation also provides low and high level alarms to alert the Operator to failure of the transfer pump to start or stop. Transfer of fuel oil to the day tank is necessary for the associated EDG to provide alternating current (AC) power to its emergency bus for an extended period of time.

Upon receipt of a signal initiating diesel start, the diesel engine shaft driven fuel pump takes suction from its associated day tank through a duplex strainer and discharges fuel oil to the diesel engine through a check valve and duplex filter. A relief valve is provided to protect the system. After leaving the duplex filter, fuel flows to the supply header and circulating header. Fuel is then fed to each cylinder fuel injector. The governor controls the fuel racks which in turn regulate the amount of fuel injected to the cylinders, thus controlling the engine speed. Since the fuel oil pump is sized to pump more than the engine needs, fuel oil not used by the injectors is returned to the day tank.

As integral portions of the Diesel Fuel Oil Storage Tank Building, the two fuel oil storage tanks are horizontal, reinforced concrete tanks (or compartments) with steel liners attached to embedments in the concrete, located underground and designed to Seismic Category I requirements. The fuel oil storage tank liner is coated with inorganic zinc primer to protect against corrosion. For License Renewal, the liner is considered to be part of the DGFOSTS; and the reinforced concrete compartment and room which supports and contains the liner are considered part of the Diesel Fuel Oil Storage Tank Building structure. Each fuel oil storage tank contains enough diesel fuel for continuous operation of the diesel generator for seven days at rated load plus adequate additional capacity for testing. This storage capacity provides ample time for obtaining additional fuel oil, since additional fuel oil is readily available.

The safety related, buried piping in the DGFOSTS extends from the storage tanks to the Diesel Generator Building. The buried piping is coated and cathodically protected.

The day tanks are vertical steel tanks located in separate, isolated, fire resistant compartments, and situated so as to assure sufficient positive pressure at the engine fuel pumps. The volume of each tank provides approximately six hours of storage assuming maximum engine fuel consumption. The tank drains and overflows to the building floor drain system and is then delivered to an oil separator unit located in the yard for eventual disposal.

The DGFOSTS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The DGFOSTS is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the DGFOSTS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Performs the safety related function of storing, maintaining, and supplying fuel oil to the EDGs for continuous operation for seven days at rated load.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The DGFOSTS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The DGFOSTS is described in HNP FSAR Section 9.5.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the DGFOSTS are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the DGFOSTS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Fuel Oil Storage and Transfer System.

TABLE 2.3.3-18 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DG FUEL OIL STORAGE AND TRANSFER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Diesel Fuel Oil Storage Tank Building Tank Liners	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Fuel oil day tanks	M-1 Pressure-Boundary
Fuel Oil System Transfer Pumps	M-1 Pressure-Boundary
Fuel oil tank flame arrestor elements	M-5 Heat Transfer
Fuel oil tank flame arrestors	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.23 Diesel Generator Lubrication System

System Description

The function of the Diesel Generator Lubrication System (DGLS) is to provide essential lubrication to the components of the EDG System engines during all modes of operation.

The system consists of the following equipment (per diesel engine):

1. One engine-driven pump,
2. One motor-driven standby pump (motor-driven auxiliary lube oil pump),
3. One lube oil cooler,
4. Three lube oil strainers,
5. Two lube oil filters (one duplex filter and one keep-warm filter),
6. One lube oil keep-warm pump,
7. One lube oil prelube electric heater (lube oil heater), and
8. Piping, valves, and instrumentation.

The main circulating lube oil pump is an engine driven screw type pump which takes its suction from a lube oil sump tank located on the auxiliary module, through a strainer and circulates oil while the diesel engine is running.

The lube oil is pumped through the lube oil cooler, filters and strainers before it flows to the diesel engine bearings. The lube oil system is equipped with two full capacity lube oil filters with replaceable cartridges. Change of these cartridges can be effected while the engine is operating. Heat is rejected via the lube oil cooler, to the Diesel Jacket Water System.

During periods of diesel generator standby, the lubricating oil is kept at the proper temperature by circulating it with a motor-driven keep-warm pump through an automatically controlled electric heater located in the lube oil sump tank. This assures optimum viscosity and lubricating properties and provides for pre-start lubrication. To prevent excessive wearing of the turbocharger bearings due to lack of lubrication before the engine starts, a tap from the keep warm system provides a slow drip of oil onto the bearings.

The lube oil sump tank is provided with low level instrumentation for leak detection. The level alarm setpoint is set at a level corresponding to an oil inventory of approximately 1,300 gallons in the system. Manual monitoring of the lube oil sump tank level can be performed either locally at the tank using the installed dipstick or remotely from the engine control panel by reading of the tank level indicator.

The DGLS contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The DGLS is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the DGLS performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides essential lubrication to the components of the EDG System diesel engines.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The DGLS is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The DGLS is described in HNP FSAR Section 9.5.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the DGLS are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the DGLS components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Lubrication System.

TABLE 2.3.3-19 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR LUBRICATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Diesel Engine Lube Oil Sumps	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Lube Oil Auxiliary Pumps (Motor Driven)	M-1 Pressure-Boundary
Lube Oil Cooler components	M-1 Pressure-Boundary
Lube Oil Cooler tubes	M-5 Heat Transfer
Lube Oil Keep Warm Pumps	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.24 Diesel Generator Cooling Water System

System Description

Each diesel engine of the EDG System is provided with a separate closed loop cooling water system. This system is a forced circulation cooling water type to directly remove heat from the engine by means of jacket water. The closed loop system includes an engine driven jacket water pump, standpipe, and heat exchanger with the required interconnecting piping. The closed loop subsystem is equipped with an electric immersion heater and a motor-driven keep-warm circulating pump which maintains the engine in a ready-to-start condition. The tube side of the heat exchanger is supplied with cooling water from the ESW System. The jacket cooling water circulating pump is an engine driven centrifugal pump, designed to provide cooling water during all diesel engine loadings. The pump draws water from the bottom of the standpipe and discharges through the heat exchanger before entering the diesel engine cooling passages. The standpipe serves two purposes: it is the storage tank for the system, and it absorbs the changes in cooling water volume as the diesel engine heats up and cools down. Makeup to the system is from the potable water supply.

Provisions are provided to treat the jacket water by adding or removing chemicals.

The Diesel Generator Cooling Water System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal. Also, the system is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Diesel Generator Cooling Water System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides cooling to the EDG System diesel engines to maintain proper operating temperatures under all loading conditions.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Diesel Generator Cooling Water System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Diesel Generator Cooling Water System is described in HNP FSAR Section 9.5.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Diesel Generator Cooling Water System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the Diesel Generator Cooling Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Cooling Water System.

TABLE 2.3.3-20 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR COOLING WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Diesel Jacket Water Keep Warm Pumps	M-1 Pressure Boundary
Diesel Jacket Water Standpipes, Vents, and Heaters	M-1 Pressure Boundary
Jacket Water Cooler components	M-1 Pressure Boundary
Jacket Water Cooler tubes	M-5 Heat Transfer
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.25 Diesel Generator Air Starting System

System Description

Each Diesel Generator Air Starting System is capable of supplying a sufficient quantity of air from its associated starting air tanks to ensure a successful starting operation of the diesel engine. The function of this system is to provide sufficient compressed air to crank the cold diesel engine five times without recharging the receiver. Each cranking cycle brings the diesel generator up to a speed above that necessary to commence combustion of fuel. The Diesel Generator Air Starting System operates under the same environmental conditions as the diesel generator which it serves.

A physically separate air starting system is provided for each of the diesel generators. The starting air system consists of two AC motor driven air compressors, two moisture separators, two air dryers and two starting air tanks each capable of providing five cold start attempts. The system is designed such that failure of one receiver will not interfere with the ability of the remaining receiver to deliver the required quantity of air. Each compressor is capable of recharging one receiver within thirty minutes after a discharge corresponding to five starting attempts. Each starting air tank is equipped with an air dryer and tank drainage capability.

Each starting air tank is connected to the diesel engine starting mechanism independently. Upon receipt of a diesel generator start signal, all start air admission valves are opened simultaneously, delivering air to the air distributors and the individual air start valves in proper sequence. Coincident with admission of air to the cylinders, starting air is applied to the governor hydraulic system to open engine fuel racks to maximum fuel position on emergency start.

Air supply to each receiver is provided by a motor driven non-safety related air compressor and is isolated from the receiver by a safety grade check valve. The compressor is automatically controlled to maintain pressure in the tank by pressure switches provided on the starting air tanks. Each starting air tank is capable of starting the engine at least five times without being pressurized by the compressor.

The Diesel Generator Air Starting System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Diesel Generator Air Starting System is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Diesel Generator Air Starting System performs the following System Intended Function(s) for License Renewal:

10 CFR54.4(a)(1) Functions	• Performs the safety related function of providing compressed air to crank the diesel engine five times without recharging the receiver.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Diesel Generator Air Starting System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and
3. Components that are relied on during postulated fires.

FSAR and Drawing References

The Diesel Generator Air Starting System is described in HNP FSAR Section 9.5.6. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Diesel Generator Air Starting System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the Diesel Generator Air Starting System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Air Starting System.

TABLE 2.3.3-21 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR AIR STARTING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Diesel Starting Air Tanks	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.26 Security Power System

System Description

The Security Power System provides reliable power to the Security Building and various plant security equipment. The system employs both an uninterruptible power supply, provided by an inverter, and an auxiliary diesel generator power source for this purpose. The Security Power System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The Security Power System provides power to security perimeter lighting used by for personnel access and egress routes to equipment during a postulated fire.

Scoping and screening of electrical components is discussed in Section 2.5; this subsection addresses the mechanical components associated with the Security Power System auxiliary diesel generator.

Based on the above discussion, the Security Power System provides the following system intended function:

10 CFR54.4(a)(3) Functions	• Provides power for lighting relied on to support fire protection activities.

The Security Power System is in the scope of License Renewal, because it contains:

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The Security Power System is not described in the HNP FSAR.

The License Renewal scoping boundaries for the Security Power System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0271-LR

Components Subject to Aging Management Review

The table below identifies the Security Power System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Security Power System.

TABLE 2.3.3-22 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECURITY POWER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried tanks	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Diesel combustion air intake piping, piping components, and piping elements	M-1 Pressure-Boundary
Diesel engine exhaust piping, piping components, and piping elements	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Fuel Oil System Transfer Pumps	M-1 Pressure-Boundary
Fuel oil tank flame arrestor elements	M-5 Heat Transfer
Fuel oil tank flame arrestors	M-1 Pressure-Boundary
Lube Oil Cooler components	M-1 Pressure-Boundary
Lube Oil Cooler tubes	M-5 Heat Transfer
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Radiator Components	M-1 Pressure-Boundary
Radiator tubes	M-5 Heat Transfer
Tanks	M-1 Pressure-Boundary

2.3.3.27 Instrument Air System

System Description

The Instrument Air System is part of the compressed air supply system which provides dry, filtered, oil-free compressed air to meet pneumatic instrument and control requirements. Any of three air compressors may be used to supply the Instrument Air System. The Service Air System is normally connected to the Instrument Air System.

Automatic isolation of the Service Air System is provided by a control valve located in a common header in the event of decreased Service Air Receiver pressure, thereby preserving instrument air pressure.

Operation of the Instrument Air System is not required for the initiation of any engineered safety feature systems, safe shutdown system, or any other safety related system and, therefore, is not considered a safety related system except for those portions limited to the piping and valves associated with containment isolation and check valves in piping to accumulators utilized for safety related valves in other systems.

Instrument Air System components include two instrument air receivers, two service air receivers, two breathing air receivers, piping, valves and instrumentation. The air receivers are located in the outdoor portion of the TB. At the containment penetration for the Instrument Air System, there is an air operated containment isolation valve located outside the containment. Containment isolation valve position indication is a RG 1.97 Category 1 function.

Accumulators store compressed air/gas to be used in actuation of selected valves which are required to operate during and following an accident, when credit cannot be taken for the availability of air compressors. Systems and components supplied with accumulators include the Pressurizer PORVs, Containment Hydrogen Purge System valves, and Containment Vacuum Breaker System relief valves.

Air operated valves not provided with accumulators are designed such that they will fail in their required safe position on loss of instrument air pressure.

The Instrument Air System contains non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Instrument Air System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ and SBO.

Based on the above discussion, the Instrument Air System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides a pressure boundary for accumulators in safety related systems, • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ and SBO.

The Instrument Air System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

3. Components that are relied on during postulated station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Instrument Air System is described in HNP FSAR Section 9.3.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Instrument Air System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0301-LR

Components Subject to Aging Management Review

The table below identifies the Instrument Air System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Instrument Air System.

TABLE 2.3.3-23 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: INSTRUMENT AIR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.28 Service Air System

System Description

The Service Air System is part of the compressed air supply system and is designed to deliver dry, filtered, oil-free compressed air for operation of pneumatic tools and other non-safety related services. The Service Air System performs no safety related function other than containment isolation. Service air lines penetrating the Containment structure are provided with locked closed manual isolation valves located outside the containment.

Compressed air from the Service Air Receivers supplies the service air requirements. The Service Air System consists of piping, valves and instrumentation located downstream of the service air receivers, which are located in the TB. Safety related system piping is associated with the Containment penetration as well as certain supply piping for the Essential Services Chilled Water System.

Interfacing systems include the Instrument Air System. A control valve located in the common header for the Service Air and Instrument Air Systems provides for automatic isolation of the Service Air System from the Instrument Air System in the event of decreased service air receiver pressure, thereby preserving instrument air pressure. The compressed Air supply system compresses, filters, and dries air supplied to the Service Air System. The design connections for the air compressors enable any of the three compressors to be used to supply the Service Air System.

The Service Air System contains non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Service Air System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for SBO.

Based on the above discussion, the Service Air System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with SBO.

The Service Air System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated station blackout events.

FSAR and Drawing References

The Service Air System is described in HNP FSAR Section 9.3.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Service Air System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0300-LR

Components Subject to Aging Management Review

The table below identifies the Service Air System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Service Air System.

TABLE 2.3.3-24 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SERVICE AIR SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.29 Bulk Nitrogen Storage System

System Description

The Bulk Nitrogen Storage System provides a supply of nitrogen gas for various plant requirements. Examples of equipment which use this nitrogen are the VCT, Steam Generators during layup periods, Pressurizer Relief Tank, Reactor Makeup Water Storage tank, Main Condenser, Safety Injection System accumulators, the Main Feedwater Isolation Valve (MFIV) accumulators, and the three accumulator tanks for the Pressurizer PORVs.

The Bulk Nitrogen Storage System can be divided into two parts: (1) the bulk nitrogen storage equipment, and (2) the nitrogen distribution system composed of piping, valves, and accumulators required to service plant components. The Bulk Nitrogen Storage System consists of a cryogenic liquid storage tank, two nitrogen pumps, two pressure ambient air vaporizers, a pressure control manifold, and three pressure gas storage vessels located in the gas storage yard. A low pressure alarm informs the operator that a malfunction has occurred and corrective action is necessary to prevent interruption of gases to various users.

The Bulk Nitrogen Storage System is a non-nuclear safety related system. Failure of this system would not prevent safe, orderly shutdown of the plant. However, the system contains piping and valves that have been classified as safety related. The system also contains non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These non-safety related components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Bulk Nitrogen Storage System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that are relied on for seismic continuity.

The Bulk Nitrogen Storage System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Bulk Nitrogen Storage System is described in HNP FSAR Section 9.3.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Bulk Nitrogen Storage System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0829-LR

Components Subject to Aging Management Review

The table below identifies the Bulk Nitrogen Storage System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Bulk Nitrogen Storage System.

TABLE 2.3.3-25 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: BULK NITROGEN STORAGE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.30 Hydrogen Gas System

System Description

The Hydrogen Gas System is a non-safety related system that supplies hydrogen for two main purposes: (1) to supply the plant main generator with sufficient hydrogen gas for generator rotor and stator cooling, and (2) to supply hydrogen gas to the VCT in the CVCS for control of the oxygen concentration in the RCS. The system also includes a hydrogen gas bottle for supplying the WPB laboratories.

The Hydrogen Gas System can be divided into two parts: (1) bulk hydrogen storage equipment, composed of a cryogenic liquid hydrogen storage vessel, an ambient vaporizer, pressure control manifolds, interconnecting piping, valves, and associated instrumentation and controls, and (2) the hydrogen distribution system composed of piping and valves required to service the Turbine Generator and the VCT. The hydrogen gas storage area is located such that a malfunction or failure of a component of the hydrogen gas system has no adverse effect on any safety related system or component. Hydrogen distribution lines in safety related areas are seismically supported and/or equipped with excess flow valves so that, in case of a line break, the hydrogen concentration in the affected areas is limited. The piping that supplies the VCT in the RAB is the only distribution line that is in areas with safety related equipment. The excess flow check valve supplying this line is in the TB and supports a fire protection function by limiting the hydrogen concentration.

The Hydrogen Gas System contains non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Hydrogen Gas System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Hydrogen Gas System performs the following system intended function:

10 CFR54.4(a)(2) Functions	• Contains components that are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Hydrogen Gas System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Hydrogen Gas System is described in HNP FSAR Section 9.3.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Hydrogen Gas System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0058-LR

Components Subject to Aging Management Review

The table below identifies the Hydrogen Gas System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Hydrogen Gas System.

TABLE 2.3.3-26 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: HYDROGEN GAS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.31 Fire Protection System

System Description

The HNP Fire Protection System encompasses the following design features:

1. A water supply and distribution system, including fire pumps and yard and interior distribution piping,
2. Automatic suppression systems,
3. A fire detection system, covering detection of fire, automatic suppression systems actuation, and fire protection equipment supervision and signaling,

4. Manual fire response equipment such as portable fire extinguishers, hose stations, breathing equipment, protective clothing, emergency communication equipment, and emergency lighting, and
5. Certain types of fire barriers, i.e. Fire Doors and penetrations for piping, electrical cable/conduit, and HVAC ducts.

The Fire Detection System is an electrical system. Scoping and screening of electrical systems are discussed in Section 2.5. Fire barriers are addressed as civil commodities within the associated structure. Scoping and screening of structures is discussed in Section 2.4.

Fire protection water for the plant is taken from the fresh water supply impounded in the Auxiliary Reservoir with storage capacity greatly exceeding the quantity of water required for fire protection. The reservoir is also used for storage of water used in plant operations that are both safety related and non-safety related. The reservoir has been designed with seismic considerations to assure availability of safety related water supplies. The quality of water in the reservoir is suitable for use in fire protection systems. Although the water does not require clarification or other treatment for removal of suspended solids, traveling screens are provided at the intake structure for the removal of larger impurities which may be present in the water. The water supply serves as the ultimate heat sink and the fire protection water supply, and it has sufficient capacity for both functions.

Fire protection water is supplied from the Auxiliary Reservoir by two 100-percent capacity fire pumps. Each pump is also capable of delivering the design demand over the longest route of the water supply system. One electric motor-driven fire pump and one diesel engine-driven fire pump, suitable for outdoor operation, are installed outdoors at opposite ends of the ESW Screening Structure. Each pump has a separate intake and discharges through independent underground connections into the main fire loop. The largest firewater flow and pressure requirement can be met by either of the two fire pumps. Fuel supply for the diesel-driven fire pump, is provided by a 550 gallon fuel oil tank located outdoors about 12 ft. away from the ESW Screening Structure.

The fire protection water distribution system consists of underground and aboveground piping systems. The underground system consists of a mechanical joint, ductile iron, cement or bituminous lined pipe loop around the main plant building complex. The aboveground piping is fabricated of carbon steel. The buried piping is shown on drawing 5-G-0055-LR and is designated DI, meaning ductile iron.

Fire protection main piping is not interconnected with any plant service or sanitary water systems. Fire protection system water will not be used for any non-fire related purposes, except to provide intermittent makeup to the Non-Essential Services Chilled Water System expansion tank, if necessary. Non-fire-related purposes are as approved by the Superintendent - Shift Operations.

Manual, semi-fixed type, mechanical foam systems are provided for the Auxiliary Boiler fuel oil storage tanks located in the yard. Each tank is equipped with one fixed discharge outlet and foam maker connected to a fixed piping installation. The water supply for the foam system is from the yard distribution system, taken from the nearby hydrant. For extinguishment of spill and diked area fires, auxiliary foam hose stream protection is provided. This consists of a line proportioner, hose, and foam nozzle adapter. Foam systems are not used to protect safety related systems.

The non-safety related record storage facility is located in the Administration Building. It is enclosed within a 2-hour fire rated barrier. Fire protection for the record storage facility consists of an automatic Halon 1301 system. The Administration Building is a stand-alone building located outside the protected area; its fire protection features are not relied upon to meet the requirements of 10 CFR 50.48.

The Fire Protection System penetrates the primary containment and contains safety related piping components associated with containment isolation. The system also contains Regulatory Guide 1.97, Category 1, components for indication of containment isolation valve position.

The Fire Protection System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Fire Protection System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for SBO, EQ, and fire protection.

Based on the above discussion, the Site Fire Protection System performs the following system intended function:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Fire Protection System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Fire Protection System is described in HNP FSAR Section 9.5.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Fire Protection System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0055-LR	5-G-0056-LR	5-G-0057-LR
5-G-0388-LR	5-G-0406-LR	5-G-0485-LR
	5-S-0906 S04-LR	

Components Subject to Aging Management Review

The table below identifies the Fire Protection System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System.

TABLE 2.3.3-27 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FIRE PROTECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Buried piping, piping components, and piping elements	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Diesel Driven Fire Pump	M-1 Pressure-Boundary
Diesel Driven Fire Pump Fuel Oil Storage Tank	M-1 Pressure-Boundary

TABLE 2.3.3-27 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FIRE PROTECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Diesel engine exhaust piping, piping components, and piping elements	M-1 Pressure-Boundary
Diesel Exhaust Silencers	M-1 Pressure-Boundary
Filters	M-1 Pressure-Boundary M-2 Filtration
Fuel oil tank flame arrestor elements	M-5 Heat Transfer
Fuel oil tank flame arrestors	M-1 Pressure-Boundary
Heat Exchanger Components	M-1 Pressure-Boundary
Heat exchanger tubes	M-5 Heat Transfer
Jockey Fire Pump	M-1 Pressure-Boundary
Motor-Driven Fire Pump	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Spray Nozzles	M-1 Pressure-Boundary M-8 Spray Pattern
Sprinkler Heads	M-1 Pressure-Boundary M-8 Spray Pattern
System strainer screens/elements	M-2 Filtration
System strainers	M-1 Pressure-Boundary

2.3.3.32 Storm Drains System

System Description

The purpose of the Storm Drains System is to remove plant area grade elevation run-off and route it to plant waterways. One of the functions of the Storm Drains System is to dispose of water run-off from all areas of the plant. The water is collected through local catch basins, gravity drained through concrete piping, and released through drop structures into the following plant waterways: CT Makeup Water Intake Channel, ESW Intake Channel, ESW Discharge Channel, and the Main Reservoir. Sumps are located in low elevation areas where gravity draining is impossible. Sump pumps are then used to pump the water up to the storm drain piping.

The Storm Drains System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment in the FHB. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Storm Drains System performs the following system intended functions.

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Storm Drains System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Storm Drains System is described in HNP FSAR Sections 3.4.1.1 and 9.3.3.2.2.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The portion of the Storm Drains System that is in scope for License Renewal is not shown on any scoping drawings.

Components Subject to Aging Management Review

The table below identifies the Storm Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-28 Auxiliary Systems – Summary of Aging Management Evaluation – Storm Drain System.

TABLE 2.3.3-28 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STORM DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.33 Oily Drains System

System Description

The Oily Drains System provides inputs to the Oily Waste Collection and Separation System from the following locations:

1. Diesel Fuel Oil Storage Tank Building sump,
2. Diesel Fuel Oil Unloading Area sump, and
3. Diesel Generator Building sumps.

Each diesel generator compartment and diesel fuel oil pump room is provided with floor drains to collect oil spills and sprinkler discharge water. Liquids are routed to two building sumps. Two sump pumps in each sump are provided to discharge the sump contents to the yard oil separator.

In the Fuel Oil Storage Tank Building, drainage from expected fire fighting water flow will be collected by the floor drain system and routed to the building sump. Two sump pumps discharge the water to the yard oil separator.

The major system components of the Oily Drains System include the Diesel Fuel Oil Storage Tank Building sump pumps, the Diesel Fuel Oil Unloading Area sump pump, and the Emergency Diesel Generator Building sump pumps. Portions of the system piping near the Diesel Fuel Oil Storage Tank Building and the Diesel Fuel Oil Unloading Area are buried.

The Oily Drains System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Oily Drains System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Oily Drains System performs the following system intended functions.

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Oily Drains System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Oily Drains System is described in HNP FSAR Section 9.3.3.2.2.4 and 9.3.3.2.2.6. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Oily Drains System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0133-LR 5-G-0485-LR

Components Subject to Aging Management Review

The table below identifies the Oily Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-29 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Drains System.

TABLE 2.3.3-29 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: OILY DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
System strainers	M-1 Pressure Boundary M-2 Filtration

2.3.3.34 Radioactive Floor Drains System

System Description

The Radioactive Floor Drain System is one of the radioactive drainage systems that provide the interface between reactor auxiliary equipment and the waste processing treatment facilities. They provide for the drainage of equipment, tanks, and wetted surfaces during normal plant operation.

The purpose of the Radioactive Floor Drain System is to collect and process water from the floor drains in the RAB, FHB, WPB, Tank Area/Building, and portions of the Hot Machine Shop. The Radioactive Floor Drain System uses floor drains and sumps to collect potentially radioactive drainage, including water used for fire fighting. The wastewater is then pumped to floor drain tanks for subsequent treatment by the Modular

Fluidized Transfer Demineralizer System. The water is then sampled and reused or discharged to the environment via the CT blowdown line.

Radioactive Floor Drain System equipment includes four floor drain tanks, four filters, two reverse osmosis units, two waste monitor tank demineralizers, two waste monitor tanks, and two polyelectrolyte feed tanks. To process the water, drains located in the building route water to the sumps. The sumps collect the water and pump it to one of four 25,000 gallon floor drain tanks. The tanks have sufficient capacity to allow for surges. After mixing and sampling in the tanks, normal water treatment consists of filtration and demineralization. After treatment, the water may be sent to the waste monitoring tanks or to the treated laundry and hot shower tanks. Water in these tanks is sampled; and, based on the sample results, the water will either be recycled for further treatment, routed to the Condensate Storage Tank for reuse, or discharged to the environment.

In the WPB, drainage from expected non-radioactive areas will be collected by the sanitary drainage system and discharged to the site sanitary drainage system. Drainage from radioactive areas will be collected by the radioactive floor drain system and discharged to the floor drain tanks.

The Radioactive Floor Drains System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Radioactive Floor Drains System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Radioactive Floor Drains System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Radioactive Floor Drains System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Radioactive Floor Drains System is described in Sections 9.3.3.2.1 and 9.3.3.2.2.6 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Radioactive Floor Drains System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0090-LR	5-G-0184-LR	5-G-0185-LR
5-G-0187-LR	5-G-0427-LR	5-G-0428-LR
5-G-0816-LR	5-G-0866-LR	

Components Subject to Aging Management Review

The table below identifies the Radioactive Floor Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-30 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Floor Drains System.

TABLE 2.3.3-30 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIOACTIVE FLOOR DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
System strainers	M-1 Pressure Boundary M-2 Filtration
Tanks	M-1 Pressure Boundary

2.3.3.35 Radioactive Equipment Drains System

System Description

The Radioactive Equipment Drain System is one of the radioactive drainage systems that provide the interface between reactor auxiliary equipment and the waste processing treatment facilities. They provide for the drainage of equipment, tanks, and wetted surfaces during normal plant operation.

The purpose of the Radioactive Equipment Drains System is to collect and transfer reactor grade water from equipment leaks and drains, valve leakoffs, pump seal leakoffs, tank overflows, and tritiated water sources to the waste holdup tank.

Drainage to the Equipment Drain System is confined to high purity wastes capable of active gas releases. There are no floor drains connected to the system except in the Containment Building and all equipment drains are of the closed type without traps. The uppermost portion of the drainage system in each building is provided with vents which are connected to that building's contaminated ventilation system. To mitigate the consequences of leakage during ECCS recirculation following an accident, the Equipment Drain System in the RAB is also connected to the RAB Emergency Exhaust System.

The system collects and transfers contaminated or potentially contaminated water leakage from equipment to collection tanks in waste processing. The Equipment Drain System consists of the reactor coolant drain tank, two reactor coolant drain tank pumps, the reactor coolant drain tank heat exchanger, the equipment drain transfer tank, two equipment drain transfer pumps, ten equipment drain sumps, twenty equipment drain sump pumps, and equipment drain piping.

Liquid from the reactor coolant drain tank is normally transferred to the recycle holdup tank via the reactor coolant drain tank pumps and the reactor coolant drain tank heat exchanger. Liquid collected in part of the piping system gravity flows to the equipment drain transfer tank and is pumped to the waste holdup tank by the equipment drain transfer pumps.

The remainder of the liquid collected by the piping system gravity flows to the ten sumps and is transferred to the waste holdup tank by sump pumps. Each sump contains two pumps. The position of reactor coolant drain tank level control valve is controlled by signals from the reactor coolant drain tank level controller to maintain the level in the reactor coolant drain tank within a specified band with one reactor coolant drain tank pump continuously operating.

There are two containment isolation valves in series in the containment sump pump discharge line to the waste holdup tank. Receipt of a CIS will close both. Upon receipt of a CIS, the level control valve will isolate that portion of the reactor coolant drain tank subsystem inside containment, and the pump discharge valve is automatically closed to isolate the portion of the reactor coolant drain tank pump discharge line that is external to the containment.

The Radioactive Equipment Drains System contains components that interface with those required to collect fire fighting water flow.

The Radioactive Equipment Drains System includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1, function.

The Radioactive Equipment Drains System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Radioactive Equipment Drains System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection, EQ, and SBO.

Based on the above discussion, the Radioactive Equipment Drains System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Radioactive Equipment Drains System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the EQ Program.

FSAR and Drawing References

The Radioactive Equipment Drains System is described in Sections 9.3.3.2.1 and 9.3.3.2.2.6 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Radioactive Equipment Drains System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0168-LR	5-G-0184-LR	5-G-0185-LR
5-G-0187-LR	5-G-0427-LR	5-G-0428-LR
5-G-0813-LR	5-G-0814-LR	

Components Subject to Aging Management Review

The table below identifies the Radioactive Equipment Drains System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-31 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Equipment Drains System.

TABLE 2.3.3-31 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Containment isolation piping and components	M-1 Pressure Boundary
Piping, piping components, piping elements and tanks	M-1 Pressure Boundary
Reactor Coolant Drain Tank Heat Exchanger components	M-1 Pressure Boundary
Reactor Coolant Drain Tank Heat Exchanger tubes	M-5 Heat Transfer
System strainers	M-1 Pressure Boundary M-2 Filtration

2.3.3.36 Secondary Waste System

System Description

Secondary Waste System provides for drainage of high and low conductivity wastes generated by secondary steam and condensate, condensate polisher regeneration, steam generator blowdown electromagnetic filter back flush equipment, miscellaneous leak-off points, and certain floor drainage in the TB and FHB. HVAC condensate drains are also part of this system.

Secondary Waste Drains are located in their respective buildings near equipment requiring secondary waste-type drains. In general, drainage to the Secondary Waste Drains is confined to water coming from the TB which may contain oil and/or acid and caustic and water from the FHB. However, HVAC condensate drains collect condensate drainage from HVAC units in the RAB, WPB, and FHB. The drainage flows by gravity to the HVAC condensate transfer tank in the RAB, the WPB HVAC condensate basins in the WPB, and the condensate receiver transfer tank in the FHB from which it is pumped to industrial waste processing.

Secondary Waste Drains, other than the HVAC condensate drains, collect liquid wastes in industrial waste sumps, the acid and caustic sump, and the secondary waste sump. Water from the industrial waste sumps is transferred to the low conductivity holding tanks or oil water separator for treatment; while water from the acid and caustic sump and the secondary waste sump is transferred to the high conductivity holding tank for treatment.

After treatment and sampling that shows acceptable purity, water may be released in a controlled manner to the environment. A portion of the piping routed to the oil-water separator is buried.

The Secondary Waste System includes components in the CCW Drainage System. However, CCW System drainage and leakoff is handled separately because it contains corrosion inhibitors.

The Secondary Waste System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Secondary Waste System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Secondary Waste System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Secondary Waste System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Secondary Waste System is described in HNP FSAR Section 9.3.3.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Secondary Waste System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0090-LR	5-G-0184-LR	5-G-0185-LR
5-G-0187-LR	5-G-0428-LR	5-G-0429-LR
5-G-0485-LR	5-G-0814-LR	5-G-0816-LR
5-G-0819-LR	5-G-0825 S01-LR	

Components Subject to Aging Management Review

The table below identifies the Secondary Waste System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-32 Auxiliary Systems – Summary of Aging Management Evaluation – Secondary Waste System.

TABLE 2.3.3-32 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECONDARY WASTE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure Boundary

2.3.3.37 Laundry and Hot Shower System

System Description

The Laundry and Hot Shower System is a subsystem of the Liquid Waste Processing System. It collects, stores, and processes potentially radioactive liquid wastes from detergent, hot shower, decontamination drains, and various sumps.

The Laundry and Hot Shower System is designed to accept inputs from the WPB detergent drain sump, the RAB detergent drain sump, FHB detergent drain sump, FHB decontamination receiving and transfer tank, and the gravity detergent drains. The Laundry and Hot Shower System receives input from chemical drains, fuel cask wash, and fuel pool drains. However, laundry is sent off site for processing; therefore, there are no laundry wastes.

The system is designed to process accumulated liquids using filtration, reverse osmosis, evaporation, and ion exchange when required to meet water quality requirements. The system transfers the processed water to the treated laundry and hot shower tanks where it is mixed and sampled.

The Laundry and Hot Shower System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

In addition, the Laundry and Hot Shower System interfaces with systems required to collect fire fighting water drainage flow in the Fuel Handling, Reactor Auxiliary, and Waste Processing Buildings.

Based on the above discussion, the Laundry and Hot Shower System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Laundry and Hot Shower System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Laundry and Hot Shower System is described in HNP FSAR Section 11.2.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Laundry and Hot Shower System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0184-LR	5-G-0185-LR	5-G-0187-LR
5-G-0427-LR	5-G-0816-LR	5-G-0825 S01-LR

Components Subject to Aging Management Review

The table below identifies the Laundry and Hot Shower System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-33 Auxiliary Systems – Summary of Aging Management Evaluation – Laundry and Hot Shower System.

TABLE 2.3.3-33 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LAUNDRY AND HOT SHOWER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Fuel Handling Building Decontamination Receiving and Transfer Tank	M-1 Pressure Boundary

TABLE 2.3.3-33 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LAUNDRY AND HOT SHOWER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Fuel Handling Building Decontamination Transfer Pumps	M-1 Pressure Boundary
Fuel Handling Building Detergent Drain Sump Pumps	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary
Reactor Auxiliary Building Detergent Drain Sump Pumps	M-1 Pressure Boundary
System strainers	M-1 Pressure Boundary M-2 Filtration
Waste Processing Building Laundry and Hot Shower Tanks	M-1 Pressure Boundary

2.3.3.38 Upflow Filter System

System Description

The Upflow Filter System was formerly a subsystem of the Primary Filtered Makeup Water System. The Primary Filtered Makeup Water System is designed to provide treated water for plant use in the Potable and Sanitary Water and Demineralized Water Systems. However, the Upflow Filter System components in the Water Treatment Building have been abandoned in place. The modified Primary Filtered Makeup System (FMS) consists of a microfiltration system followed by a nanofiltration system. Both filtration systems are skid-mounted and are located in the Water Treatment Building. They have redundant filtration flowpaths and provide treated water for plant use in the Potable Water System and Demineralized Water System.

Water from the Main Reservoir is delivered to the FMS using the CTMU Pumps at the ESW & CT Makeup Water Intake Structure. As an alternate source, water from the Auxiliary Reservoir can be delivered to the FMS using the alternate supply pump located in the ESW Screening Structure. The alternate supply pump and associated supply piping are designated as part of the Upflow Filter System. This source of raw water is independent of CTMU Pump operation. The supply piping to the FMS equipment is underground and located in the Yard.

The ESW Screening Structure contains other systems that have safety related equipment, and the Upflow Filter System components located in the ESW Screening Structure are not safety related. Therefore, it was concluded that the Upflow Filter System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Upflow Filter System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Upflow Filter System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Upflow Filter System is described in HNP FSAR Section 9.2.3.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Upflow Filter System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0049 S01-LR 5-G-0308-LR

Components Subject to Aging Management Review

The table below identifies the Upflow Filter System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-34 Auxiliary Systems – Summary of Aging Management Evaluation – Upflow Filter System.

TABLE 2.3.3-34 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: UPFLOW FILTER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.39 Potable and Sanitary Water System

System Description

The Potable and Sanitary Water System provides the plant and the Harris Energy and Environmental Center with water suitable for human consumption and for the operation of all sanitary plumbing fixtures and selected equipment. The Potable and Sanitary Water System provides both hot and cold water at required pressures, flow rates, and temperature.

As described in the previous subsection for the Upflow Filter System, water from the main or auxiliary reservoir is processed by two trains of filtration systems to produce highly filtered water which can be routed to the Potable Water Clearwell for use as site drinking and sanitary water. The Potable Water Clearwell provides a reserve volume of treated water available to the site Potable Water distribution system, and ensures that adequate chlorine contact time is achieved for disinfection. The site distribution system pressure is maintained by three repressurization pumps located on the outlet of the Clearwell.

The Potable and Sanitary Water System piping supplies water through branch lines to the site structures and the Harris Energy and Environmental Center, and the building distribution piping provides water to plumbing fixtures and equipment. The system supplies the CWS and NSW System pump bearings and Diesel Generator Cooling Water System makeup.

The Potable and Sanitary Water System is not cross-connected to any fixture or equipment having the potential for containing radioactive material. The boundary between the Potable and Sanitary Water System and the Diesel Generator Cooling Water System is at safety related check valves that are part of the Diesel Generator Cooling Water System. When required, a temporary hose is connected from the non-safety related piping in the Potable and Sanitary Water System to fill the Diesel Generator Standpipes.

The Potable and Sanitary Water System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The Potable and Sanitary Water System is an alternate supply of cooling water for the NSW pump seals and bearings. As such, it has piping and check valves that form a pressure boundary with the NSW System booster pump discharge piping. The pressure boundary piping components are in the scope of license renewal since NSW pumps are credited for Safe Shutdown in case of certain fire scenarios. Thus, the Potable and

Sanitary Water System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for Fire Protection.

Based on the above discussion, the Potable and Sanitary Water System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Potable and Sanitary Water System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Potable and Sanitary Water System is described in HNP FSAR Section 9.2.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Potable and Sanitary Water System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0049 S01-LR 5-G-0436-LR

Components Subject to Aging Management Review

The table below identifies the Potable and Sanitary Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-35 Auxiliary Systems – Summary of Aging Management Evaluation – Potable and Sanitary Water System.

TABLE 2.3.3-35 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: POTABLE AND SANITARY WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.40 Demineralized Water System

<u>System Description</u>

The Demineralized Water System provides a supply of water at specified quality limits sufficient for the expected makeup demands used by various systems, including the RCS, and demands for plant startup and operation with allowance for the regeneration of the demineralizers and a normal amount of downtime for maintenance.

The Demineralized Water System is designed to supply demineralized water to the 500,000 gallon Demineralized Water Storage Tank (DWST). One of two demineralized water transfer pumps will be in continuous operation and distributes water to the following:

1. Reactor Makeup Water Storage Tank,
2. Condensate Storage Tank,
3. Refueling Water Storage Tank, and
4. Miscellaneous users.

The Demineralized Water System is capable of supplying normal makeup needs with additional capacity for filling the Condensate Storage, Refueling Water Storage, and Reactor Makeup Water Storage Tanks. Pretreated water flows through one or both makeup demineralizer trains of the Demineralized Water System to the DWST. Each demineralizer train consists of one carbon adsorption unit and three mixed bed demineralizers. A vacuum degasifier is common to both trains. A low sodium mixed bed demineralizer downstream of the mixed bed demineralizers maintains low sodium levels in the DWST to support SG operations with the condensate polishers bypassed. This equipment is located in the Water Treatment Building. The DWST and transfer pumps are located in the yard, along with the associated valves and piping.

The effluent from the demineralizers is normally stored in the DWST. Normally, a diaphragm placed inside the tank eliminates contact between the atmosphere air and the tank contents. However, a nitrogen sparger has been placed inside the tank as a contingency against possible oxygen excursions.

The Demineralized Water System serves no safety function since it is not required to achieve safe shutdown or mitigate the consequences of an accident. Components within the Demineralized Water System are relied on for Containment Isolation and are, therefore, safety related and Seismic Category I. The integrity of the associated Containment penetration was evaluated in the Station Blackout Analysis and found not to be of concern.

The Demineralized Water System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Demineralized Water System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for SBO.

Based on the above discussion, the Demineralized Water System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with SBO.

The Demineralized Water System is in the scope of License Renewal, because it contains:

1. A component that is safety related and is relied upon to remain functional during and following design basis events,
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and
3. Components that are relied on during postulated station blackout events.

FSAR and Drawing References

The Demineralized Water System is described in HNP FSAR Section 9.2.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Demineralized Water System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0049 S02-LR   5-G-0299-LR

Components Subject to Aging Management Review

The table below identifies the Demineralized Water System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-36 Auxiliary Systems – Summary of Aging Management Evaluation – Demineralized Water System.

TABLE 2.3.3-36 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DEMINERALIZED WATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure Boundary
Containment isolation piping and components	M-1 Pressure Boundary
Piping, piping components, and piping elements	M-1 Pressure Boundary

2.3.3.41 Filter Backwash System

System Description

The Filter Backwash System is a subsystem of the Liquid Waste Processing System. The purpose of the Filter Backwash System is to backflush designated flushable filters to collect, store, and transfer filtered sludge and particulates to the Solid Waste Processing System via the filter particulate concentrates tank.

The Filter Backwash System is designed to backflush the filters of the following systems:

1. Liquid Waste Processing System,
2. Secondary Waste Treatment System,

3. Chemical and Volume Control System,
4. Boron Recycle System, and
5. Spent Fuel Pool Cooling, and
6. Spent Fuel Pool Cleanup System.

Filters in the above systems are backwashed and their filtered waste is sent to their respective filter backwash transfer tanks. These wastes consist of corrosion products, sludge, and other particulate matter suspended in a small amount of backwash water. These wastes are routed to a single backwash storage tank in the WPB where they are transferred to the waste holdup tank for processing. Equipment for handling filter backwash sludge includes four backwash transfer tanks, one backwash storage tank, one filter particulate concentrate tank, and two backwash storage tank filters.

When a differential pressure across one of the filters serviced by the Filter Backwash System indicates backwashing is necessary, the filter will be taken out of service and the material removed by in-place backflushing. Material is removed from the filters by the high pressure flow of nitrogen, supplied by the associated nitrogen accumulator, in the reverse direction of the normal flow.

The filtered waste is sent to the respective filter backflush transfer tanks. The filter backwash transfer tank pumps are used to transfer the filter sludge to the backwash storage tank in the WPB. The filter backwash storage tank pumps recycle the sludge through the backwash storage tank filters. After filtering, the liquid is sent to the waste hold-up tanks to be held for further processing. The sludge from the filters is pumped to the filter particulate concentrates tank. The contents of the filter particulate concentrates tank are routed to either the solidification system or the spent resin storage tanks by the filter particulate concentrate tank pumps.

The components in Filter Backwash System perform no safety related functions. However, the system contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Filter Backwash System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Filter Backwash System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Filter Backwash System is described in HNP FSAR Section 11.2.2.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Filter Backwash System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0829-LR 5-G-0847-LR

Components Subject to Aging Management Review

The table below identifies the Filter Backwash System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-37 Auxiliary Systems – Summary of Aging Management Evaluation – Filter Backwash System.

TABLE 2.3.3-37 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FILTER BACKWASH SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.42 Radiation Monitoring System

System Description

The Radiation Monitoring System consists of the Process and Effluent Radiological Monitoring and Sampling Systems and the Area and Airborne Radioactivity Monitoring Systems. The major function of the Radiation Monitoring System is to provide plant operations personnel and health physics personnel with both current and historical measurements of radiological conditions in certain areas and plant systems during both normal and design basis conditions. In addition, this system automatically produces alarms to warn plant personnel and in certain cases exerts control action when unusual radiological conditions or equipment malfunctions occur.

The Radiation Monitoring System is divided into a non-safety related portion and a safety related portion.

The Radiation Monitoring System consists of the following:

1. Area Radiation Monitoring System,
2. Airborne Radiation Monitoring System,
3. Process Radiological Monitoring System,
4. Effluent Radiological Monitoring System, and
5. Process and Effluent Radiological Sampling System.

Area Radiation Monitoring System

The normal functions of the Area Radiation Monitoring System are to provide local and remote indication and alarms of ambient gamma radiation in general plant areas; to furnish records, including radiation survey information, of radiation levels in specific areas of the plant; and to warn of uncontrolled or inadvertent movement of radioactive material in the plant.

The functions of the Area Radiation Monitoring System during postulated accidents are to initiate a CIS in the unlikely event of a LOCA or abnormally high radiation inside the Containment, to provide long-term post-LOCA monitoring of conditions inside the Containment and in vital access areas outside Containment, and to provide a signal to isolate the FHB and start the emergency ventilation system in the event of a fuel handling accident.

Airborne Radiation Monitoring System

The normal functions of the Airborne Radiation Monitoring System are to inform operations personnel and furnish records of airborne particulate, iodine, and gaseous activity trends in the various plant structures; to help detect identified or unidentified leaks from the reactor coolant pressure boundary (as recommended in RG 1.45) and other areas of the plant; to provide information for evaluation of the performance of plant systems that function to minimize the release of airborne radioactivity; and to provide information for the purpose of maintaining low in-plant personnel radiation exposure via inhalation of airborne particulates and iodine, in accordance with 10 CFR Part 20.

The functions of the Airborne Radiation Monitoring System during postulated accidents are to provide the particulate and gaseous radioactivity levels inside the Containment; to initiate a signal to close the normal Control Room outside air intake valves, stop the exhaust fans, close the exhaust dampers, start up the emergency filtration fans, and put the air flow into the recirculation mode; and to provide the radioactivity levels at each emergency air intake, thereby allowing the operator to choose which emergency intake to open.

Process Radiological Monitoring System

The Process Radiological Monitoring System, supplemented by the Process Sampling System (i.e., the Primary Sampling, Secondary Sampling, and Post-Accident Sampling Systems), is designed to provide radiological information for system operation and to provide for early detection of radioactivity leakage into normally non-radioactive systems. The system contains safety related components for monitoring the CCW System radioactivity levels. These monitors detect leakage into the system from equipment that may contain radioactivity.

Effluent Radiological Monitoring System

The normal functions of the Effluent Radiological Monitoring System are to provide representative sampling, monitoring, storage of information, indication and if necessary, alarm on liquid and gaseous radioactivity levels in plant effluents; to initiate automatic closure of the waste discharge valves before effluent release limits are approached or exceeded; and to detect non-condensable fission product gases so that the gases can be redirected to high efficiency particulate air (HEPA) and charcoal filters before release to the environment.

The Effluent Radiological Monitoring System contains safety related components for performing the following functions:

1. FHB emergency exhaust monitors measure effluent releases after a postulated fuel handling accident. These monitors are part of the safety related portion of the Radiation Monitoring System and are located downstream of the HEPA-charcoal filter units of each of the two emergency exhaust ducts.
2. The plant vent stack monitor provides a continuous indication of the activity levels of radioactive materials released to the environment from the plant vent stack.
3. Main Steam Line Monitors are used to estimate the releases which may occur as a result of the actuation of steam generator Safety Relief Valves (SRV) and Atmospheric Steam Dump Valves (ASDV).

Process Sampling System

The Process Sampling System provides grab samples during normal operations and anticipated operational occurrences to supplement the Process and Effluent Radiological Monitoring Systems, and in particular is designed to provide specific information regarding specific radionuclide composition of process and effluent streams.

The Radiation Monitoring System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The system includes electrical components required to perform in a harsh environment during accident condition.

The Radiation Monitoring System contains components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Radiation Monitoring System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Isolates containment on high radiation conditions, • Detects leakage of radioactivity into the CCW System, • Isolates the FHB and starts the FHB emergency ventilation system in the event of a fuel handling accident, • Provides indication of particulate and airborne activity in containment, • Automatically actuates Control Room ventilation components to limit doses to the operators, • Monitors radiological effluents from the FHB emergency exhaust ducts, the plant stack, and the Main Steam System safety and atmospheric steam dump valves, and • Supports post-accident monitoring of radiological conditions in containment, in the Control Room, and in vital access areas outside Containment.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The Radiation Monitoring System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Radiation Monitoring System is described in HNP FSAR Sections 12.3.4 and Section 11.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Radiation Monitoring System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0105-LR	8-G-0517-LR	8-G-0517 S03-LR
8-G-0533-LR	8-G-0533 S07-LR	8-G-0562-LR

Components Subject to Aging Management Review

The table below identifies the Radiation Monitoring System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-38 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring System.

TABLE 2.3.3-38 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADIATION MONITORING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Containment Isolation piping and components	M-1 Pressure-Boundary
Flow Straighteners	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.43 Oily Waste Collection and Separation System

System Description

The Oily Waste Collection and Separation System is designed to collect non-radioactive oily water generated during normal plant operation or during fire fighting using hoses or sprinklers. This system accepts water inputs from areas of the plant that could potentially contain oil or oily solid contaminants. The water is separated from any oil or oily solid contaminants and the water is discharged to the waste neutralization basin to remove any residual hydrazine and adjust pH. Oil wastes are drummed for off-site shipment.

The Oily Waste Collection and Separation System accepts inputs from the following locations:

1. Auxiliary Boiler fuel oil diked area sump,
2. Auxiliary Boiler fuel oil unloading area sump,
3. Diesel Fuel Oil Storage Tank Building sump,
4. Diesel Fuel Oil Storage Unloading Area sump,
5. Diesel Generator Building sumps,
6. Turbine Building condensate pump area sump,
7. Security Building oil sump,
8. Turbine Building industrial waste sumps, and
9. Paint Shop and Storage Building sump.

In the Diesel Fuel Oil Storage Tank Building, drainage from expected fire fighting water flow will be collected by the floor drain system and routed to the building sumps. The sump pumps will discharge the water to the yard oil separator which pumps its contents to the Waste Neutralization System.

Major system components include the following:

1. Oil-water separator and holding tanks,
2. Water transfer pumps,
3. Oil transfer pumps,
4. Sludge transfer pumps,
5. Sludge bin, and
6. Sump pumps in the areas where oily water is collected.

The Oily Waste Collection and Separation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The Oily Waste Collection and Separation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Oily Waste Collection and Separation System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Oily Waste Collection and Separation System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Oily Waste Collection and Separation System is described in HNP FSAR Section 9.3.3.2.2.4, 9.3.3.2.2.5, and 9.3.3.2.2.6. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Oily Waste Collection and Separation System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0133-LR 5-G-0185-LR 5-G-0485-LR

Components Subject to Aging Management Review

The table below identifies the Oily Waste Collection and Separation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-39 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste Collection and Separation System.

TABLE 2.3.3-39 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: OILY WASTE COLLECTION AND SEPARATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.44 Liquid Waste Processing System

System Description

The Liquid Waste Processing System provides for the collection, storing, processing, and controlled release of radioactive and potentially radioactive liquids associated with the operation of the nuclear power plant. The discharge of treated wastes is controlled and monitored to ensure that any discharges are as low as is reasonably achievable.

The Liquid Waste Processing System is designed to collect all primary plant radioactive waste water and, by processing, reduce the radionuclide concentration to permit its discharge to the environs. In addition, the Liquid Waste Processing System is designed to treat occasional batches of secondary liquids should primary to secondary leakage occur. The system is divided into six subsystems:

1. Equipment Drain Treatment System,
2. Floor Drain Treatment System,
3. Laundry and Hot Shower Treatment System,
4. Chemical Drains System,
5. Filter Backwash System, and
6. Secondary Waste Treatment System.

These subsystems segregate the various types of liquid radwaste based on their source because of their composition and process requirements. Waste input to the Floor Drain Treatment System, Laundry and Hot Shower System, and the Chemical Drain System have not differed to the point that separate processing trains have been necessary. These wastes are processed using the Modular Fluidized Transfer Demineralization System (MFTDS), which is designed to reduce the radionuclide concentrations in the station effluents, with no intent of producing reactor coolant quality water from the liquid radwaste.

The Liquid Waste Processing System contains components that interface with those required to collect fire fighting water.

This system is conservatively assumed to meet the 10 CFR 54.4(a)(1) scoping criteria because it contains components having one or more safety related quality classifications.

The Liquid Waste Processing System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Liquid Waste Processing System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The system interfaces with systems required to collect fire fighting water drainage flow in the Fuel Handling, Reactor Auxiliary, and Waste Processing Buildings.

Based on the above discussion, the Liquid Waste Processing System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Liquid Waste Processing System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The Liquid Waste Processing System is described in HNP FSAR Section 11.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Liquid Waste Processing System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0090-LR	5-G-0429-LR	5-G-0804-LR
5-G-0805-LR	5-G-0806-LR	5-G-0811-LR
5-G-0813-LR	5-G-0814-LR	5-G-0816-LR
5-G-0817-LR	5-G-0829-LR	5-G-0847-LR

Components Subject to Aging Management Review

The table below identifies the Liquid Waste Processing System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-40 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System.

TABLE 2.3.3-40 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: LIQUID WASTE PROCESSING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Liquid Waste Holdup Tank	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.45 Secondary Waste Treatment System

System Description

The Secondary Waste Treatment System collects, stores, and processes the following potentially radioactive wastes:

1. Low conductivity wastes from condensate polisher rinsing, steam generator blowdown electromagnetic filter backflush, contaminated auxiliary steam condensate, and industrial waste sumps, and
2. High conductivity wastes from condensate polisher regeneration and the TB acid and caustic sumps.

The components of the Secondary Waste Treatment System are not safety related and are not required to operate during a design basis accident.

Wastewater entering the Secondary Waste Treatment System is initially segregated based on the anticipated waste conductivity. During Condensate Polishing Demineralizer System or Steam Generator Blowdown System regenerations, the steps that involve acid, caustic or ammonia injection are routed to the high conductivity hold up tank. Once the bulk of the regenerant has been rinsed from the resin bed, the balance of the rinse water is directed to the low conductivity holdup tanks.

There are three 15,000 gallon low conductivity holding tanks. Inputs to these tanks come from condensate polisher rinse water, steam generator blowdown demineralizer rinse water, and potentially from industrial waste streams. Two low conductivity holding tank pumps are used to mix or discharge the contents of the low conductivity holding tanks. Eductors are supplied in each low conductivity holding tank so that the contents can be thoroughly mixed.

There is one 15,000 gallon high conductivity holding tank. Inputs to this system consist of drains from the TB acid and caustic sump and chemical regeneration solutions from the condensate polisher or steam generator blowdown demineralizers. A high conductivity holding tank mixing pump and seven mixing eductors in the high conductivity holding tank are provided to thoroughly mix the liquid.

The low conductivity subsystem and high conductivity subsystem share a common discharge through the secondary waste bag filter to the secondary waste sample tank.

In the event of secondary contamination, low conductivity holding tank and/or high conductivity holding tank waste water may be transferred to the floor drain waste monitor tanks for release or further processing. In the absence of any secondary contamination, both the low conductivity holding tank and the high conductivity holding tank wastes will receive only minimal processing (filtration through the secondary waste bag filter) during transfer to the secondary waste sample tank.

The secondary waste sample tank is continuously released to the "A" waste neutralization basin, where it is pH neutralized and released to the lake through the waste neutralization settling basin to the CT blowdown line.

Major system components consist of the pH adjusting skid, holding and sample tanks, pumps, filters, piping and instrumentation and controls.

The Secondary Waste Treatment System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Secondary Waste Treatment System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Secondary Waste Treatment System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Secondary Waste Treatment System is described in HNP FSAR Section 11.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Secondary Waste Treatment System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0090-LR

Components Subject to Aging Management Review

The table below identifies the Secondary Waste Treatment System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-41 Auxiliary Systems – Summary of Aging Management Evaluation – Secondary Waste Treatment System.

TABLE 2.3.3-41 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECONDARY WASTE TREATMENT SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.46 Boron Recycle System

System Description

The Boron Recycle System receives and recycles reactor coolant effluent for the purpose of recycling it as boric acid and makeup water for use in the RCS. The system decontaminates the effluent by means of demineralization and gas stripping, and uses evaporation to separate and recover the boric acid and makeup water.

The Boron Recycle System collects and processes effluent which can be readily reused as makeup to the RCS; and, for water management purposes, as makeup to the spent fuel pools. For the most part, this effluent is the deaerated, tritiated, borated, and radioactive water from the CVCS letdown line and process drains.

The Boron Recycle System also collects water from the following sources:

1. CVCS letdown line,
2. Reactor coolant drain tank (primarily RCP seal leakage),
3. VCT and charging pump suction pressure relief and residual heat removal pumps pressure relief,
4. Boric acid blender,
5. Spent fuel pool pumps,
6. Valve leakoffs and equipment drains, and
7. SI System (flush water).

When water is directed to the Boron Recycle System, the flow passes first through the recycle evaporator feed demineralizers and filter and then into the recycle holdup tank. A waste evaporator is used at HNP to process recycled reactor coolant effluents by means of interconnection piping between the Boron Recycle System and Liquid Waste Processing System. Dissolved gases (i.e., hydrogen, fission gases and other gases) are removed before the liquid enters the evaporator shell. These gases are directed to the Gaseous Waste Processing System. During the operation of the evaporator, condensate (distillate) is continuously sent to the recycle monitor tanks via the recycle evaporator condensate demineralizer or to the waste evaporator condensate tank through the waste evaporator condensate demineralizer for release to the environment. From the recycle monitor tank, it can be sent to the reactor make-up tanks when needed for makeup or to the Liquid Waste Processing System monitor tanks.

The evaporator concentrates the boric acid solution until a 4-weight-percent solution is obtained. The accumulated batch is normally transferred directly to the boric acid tanks in the CVCS through the recycle evaporator concentrates filter. Before transferring the boric acid from the evaporator to the boric acid tank, it is analyzed; and, if it does not meet the required chemical standards, it can be diverted back to the recycle holdup tank for reprocessing or to the Liquid Waste Processing System for disposal.

The Boron Recycle System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Boron Recycle System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Boron Recycle System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Boron Recycle System is described in HNP FSAR Section 9.3.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Boron Recycle System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0189-LR	5-G-0810-LR	5-G-0811-LR
5-G-0812-LR	5-G-0813-LR	5-G-0814-LR
5-G-0829-LR		

Components Subject to Aging Management Review

The table below identifies the Boron Recycle System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-42 Auxiliary Systems – Summary of Aging Management Evaluation – Boron Recycle System.

TABLE 2.3.3-42 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: BORON RECYCLE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Heat Exchanger Components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Tanks	M-1 Pressure-Boundary

2.3.3.47 Gaseous Waste Processing System

System Description

The Gaseous Waste Processing System collects, processes, and stores gaseous wastes generated by plant operation including expected startup and maintenance operations. The system processes the influent gases by compressing them with the waste gas compressor followed by hydrogen conversion to water in the catalytic recombiner. The radioactive gases are stored in the gas decay tanks. Water formed or condensed in the system is filtered and returned to the VCT in the CVCS or to the Boron Recycle System holding tanks.

The Gaseous Waste Processing System is designed to accept gaseous inputs from the following sources:

1. CVCS VCT purge,
2. Boron Recycle System recycle evaporator,
3. Liquid Waste Processing waste evaporators (acting as recycle evaporators),
4. PRT,
5. Reactor coolant drain tank,
6. Boron Recycle System recycle holdup tank, and
7. Primary Sampling Panel.

The system is designed to assure that the release of gaseous effluents from the plant and expected offsite doses are as low as reasonably achievable.

In addition, the Gaseous Waste Processing System conforms to the requirements of General Design Criterion 60 by providing holdup capacity, thus precluding the necessity of releasing radioactive effluents during unfavorable environmental conditions. All gaseous effluent discharge paths are monitored for radioactivity, in compliance with General Design Criterion 64.

The Gaseous Waste Processing System consists mainly of a closed loop comprising two waste gas compressors, two catalytic hydrogen recombiners, and ten waste gas decay tanks to accumulate the fission product gases. The system also includes a gas decay tank drain pump, six gas traps, and a gas decay tank drain filter to permit maintenance and normal operation draining of the system. Gaseous Waste Processing System equipment is located in the WPB. The primary source of radioactive gas is the VCT purge.

The Gaseous Waste Processing System also provides sufficient capacity to hold the gases generated during reactor shutdown. Nitrogen gas from previous shutdowns is contained in the gas decay tanks. This is used to strip hydrogen from the RCS during subsequent shutdowns. One gas decay tank is normally at low pressure and is used to accept relief valve discharges from the inservice gas decay tank, the hydrogen recombiner, and the waste gas compressors.

The Gaseous Waste Processing System includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1 function.

The Gaseous Waste Processing System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Gaseous Waste Processing System is relied on in safety analyses or plant evaluations to perform functions that demonstrate compliance with NRC regulations for EQ and SBO.

Based on the above discussion, the Gaseous Waste Processing System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with SBO and EQ.

The Gaseous Waste Processing System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Gaseous Waste Processing System is described in HNP FSAR Section 11.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Gaseous Waste Processing System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0813-LR 5-G-0817-LR 5-G-0818-LR

Components Subject to Aging Management Review

The table below identifies the Gaseous Waste Processing System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-43 Auxiliary Systems – Summary of Aging Management Evaluation – Gaseous Waste Processing System.

TABLE 2.3.3-43 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: GASEOUS WASTE PROCESSING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, piping elements, and tanks	M-1 Pressure-Boundary

2.3.3.48 Radwaste Sampling System

System Description

The Radwaste Sampling System transports radioactive liquid and gaseous samples from process points in the radiological waste processing systems to sample sinks. The sinks are located in shielded rooms at various places in the WPB and Tank Area/Building. Locations have been selected to minimize sample tubing runs. Ventilated hoods are provided with each sink for protection of those involved in obtaining samples. The results of analyses performed on the samples will aid operators in monitoring radwaste operations, selecting treatment paths, and demonstrating compliance of liquid and gaseous effluents with discharge limitations.

The Radwaste Sampling System provides grab samples to supplement the Process and Effluent Radiological Monitoring Systems, and in particular is designed to provide specific information regarding specific radionuclide composition of process and effluent streams. Each local monitor has provisions for obtaining a grab sample manually. The frequency of obtaining grab samples is discussed in the Offsite Dose Calculation Manual. The Radwaste Sampling System is also designed to provide a representative radioactive solid resin sample from the decanting tanks.

The Radwaste Sampling System is designed to collect representative samples from process points in the following waste processing systems:

1. Secondary Waste,
2. Filter Backwash,
3. Radioactive Floor Drains
4. Chemical Drain,
5. Spent Resin Storage and Transfer,
6. Solid Waste Processing (for recirculation loop of pretreatment tanks),
7. Waste Holdup and Evaporation,
8. Gaseous Waste Processing, and
9. Laundry and Hot Shower.

System sampling is done manually with no special instrumentation provided.

The Waste Processing Sampling System includes Safety Class 2 valves which isolate the RWST from the Waste Processing Sampling System. Therefore, the system is required to maintain the RWST pressure boundary.

The Radwaste Sampling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Radwaste Sampling System performs the following system intended functions.

10 CFR54.4(a)(1) Functions	• Contains components that maintain the pressure boundary of the RWST.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs.

The Radwaste Sampling System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Radwaste Sampling System is described in HNP FSAR Section 11.5.1.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Radwaste Sampling System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0050-LR 5-G-0429-LR

Components Subject to Aging Management Review

The table below identifies the Radwaste Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-44 Auxiliary Systems – Summary of Aging Management Evaluation – Radwaste Sampling System.

TABLE 2.3.3-44 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: RADWASTE SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.49 Refueling System

System Description

The Refueling System is a subset of the Fuel Handling System.

The Refueling System equipment consists of:

1. Manipulator crane,
2. Fuel transfer system, and

3. Fuel handling tools and fixtures.

The manipulator crane is a bridge and trolley crane with a vertical mast extending down into the refueling water. The bridge spans the refueling cavity. The bridge and trolley are used to position the vertical mast over a fuel assembly in the core. A long tube with a pneumatic gripper on the end is lowered out of the mast to grip the fuel assembly. The fuel assembly is raised and transported while inside the mast tube to its new position.

The fuel transfer system transports fuel assemblies between the FHB and Containment through the fuel transfer tube. The Fuel Transfer System includes an underwater conveyor car running on tracks extending from the refueling cavity through the transfer tube and into the fuel transfer canal. To remove a fuel assembly from the reactor, the upending frame in the refueling cavity receives a fuel assembly in the vertical position from the manipulator crane. The fuel assembly is then lowered to a horizontal position for passage through the transfer tube and raised to a vertical position by the upending frame in the fuel transfer canal. The hoist on the spent fuel bridge then takes the fuel assembly to a position in the spent fuel racks via the fuel transfer canals.

To seal the reactor Containment during unit operation, a double-gasketed blind flange is bolted on the end of the transfer tube in the refueling cavity inside containment, and a manually operated valve is locked closed in the fuel transfer canal in the FHB. The blind flange provides the containment isolation function for this penetration. The gaskets are short-lived since they are replaced whenever the flange is removed. The transfer tube and the blind flange are designed to Seismic Category I requirements.

The Refueling System includes tools and fixtures for handling fuel assemblies, rod cluster control assemblies, and other components used during refueling operations.

The Refueling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Refueling System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the Containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Refueling System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Refueling System is described in HNP FSAR Section 9.1.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Refueling System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0166-LR (location J - 1)

Components Subject to Aging Management Review

The table below identifies the Refueling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-45 Auxiliary Systems – Summary of Aging Management Evaluation – Refueling System.

TABLE 2.3.3-45 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REFUELING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.50 New Fuel Handling System

System Description

The New Fuel Handling System is a subset of the Fuel Handling System and consists of the components that transport, handle, inspect, and store new (unirradiated) fuel assemblies and maintain fuel assemblies, when stored in either a wet or dry condition, in a subcritical nuclear state.

The major components of the New Fuel Handling System consist of:

- Dry storage racks located in the new fuel inspection pit that maintain subcriticality of the new fuel assemblies stored in an ambient air environment,
- Fuel racks in Spent Fuel Pool A that can be used to store either new or spent fuel and maintain subcriticality of the new fuel assemblies when flooded with unborated water,
- The new fuel handling tool that lifts and transfers new fuel assemblies between the shipping containers and the new fuel inspection stand, dry fuel storage rack, and the new fuel elevator, and
- The new fuel elevator that lowers new fuel from the FHB operating deck level down to the bottom of the fuel transfer canal where it can be removed from the elevator by the spent fuel tool and placed in a fuel pool storage rack.

The new fuel racks, whose function is to maintain subcriticality of the fuel, are classified as safety related. The safety related function is provided by the structural design of the rack. Boraflex is encapsulated in the stainless steel walls of each storage cell of the storage racks located in Spent Fuel Pool A for neutron absorption. The System also includes the fuel inspection stand, a rod control cluster handling tool and a new fuel source tool.

In addition to the new fuel racks, the New Fuel Handling System contains electrical components and civil commodities that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal. For License Renewal, the safety related new fuel racks are evaluated as civil/structural components within the FHB.

Based on the above discussion, the New Fuel Handling System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The New Fuel Handling System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The New Fuel Handling System is described in HNP FSAR Sections 9.1.1 and 9.1.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

There are no mechanical components in the scope of License Renewal. The components in scope are civil commodities and supports for non-safety related electrical components. Therefore, there are no License Renewal scoping drawings that depict these components.

Components Subject to Aging Management Review

There are no mechanical components within the scope of License Renewal. The components that are in scope are civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4. The new and spent fuel racks are addressed as structures within the FHB.

2.3.3.51 Spent Fuel System

System Description

The Spent Fuel System is a subset of the Fuel Handling System and provides a means to safely and reliably handle and store fuel assemblies and to maintain subcriticality of fuel assemblies when stored in the fuel storage racks in the fuel pool. The major components of the Spent Fuel Handling System and their individual purposes are as follows:

- Spent Fuel Handling Tools are used to safely handle fuel assemblies in the fuel pools and transfer canals. HNP utilizes tools for handling both PWR and BWR spent fuel.

- Spent Fuel Racks are designed to safely store both PWR and BWR spent fuel assemblies. For License Renewal, the spent fuel racks are evaluated as civil/structural components within the FHB.

- Handling Tools to safely remove, transfer, and install various fuel inserts in the fuel assemblies in the pools, such as, thimble plug change tool, portable RCCA change tool, BPRA change tool, and trash basket handling tool.

The Spent Fuel System is designed to minimize the possibility of mishandling of fuel assemblies, which could cause fuel damage and possible fission product release. Safety related components in the Spent Fuel System are the fuel handling tools and the fuel storage racks. The function of the fuel handling tools is to safely and reliably handle fuel. The safety related function of the fuel racks is to maintain subcriticality of the fuel. The BWR storage racks in Pools A, B, and C and the PWR storage racks in Pools C and D are designed to maintain a subcritical array of keff < 0.95 even in the event that the pools are flooded with unborated water. Soluble boron is credited to maintain keff < 0.95 for the PWR racks in Pools A and B. A neutron absorbing material is encapsulated into the stainless steel walls of the BWR racks in Pools A, B and C and the PWR racks in Pools C and D. Some fuel racks utilize Boraflex panels as a neutron absorber; others utilize Boral plates. The function of the Boraflex and Boral material is to maintain subcriticality by absorbing neutrons.

The bridge crane AC circuit breaker and the fuel pool light fixtures are classified as seismically mounted to prevent adverse interaction with safety related equipment. Also, the Spent Fuel System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Spent Fuel System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Spent Fuel System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Spent Fuel System is described in HNP FSAR Sections 9.1.2 and 9.1.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

There are no mechanical components in the scope of License Renewal. The components in scope are civil commodities and supports for non-safety related electrical components. Therefore, there are no License Renewal scoping drawings that depict these components.

Components Subject to Aging Management Review

There are no mechanical components within the scope of License Renewal. The components in scope are civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.3.3.52 Spent Fuel Pool Cooling System

System Description

The Spent Fuel Pool Cooling System is part of the FSAR-described Fuel Pool Cooling and Cleanup Systems servicing Pools A and B - south end, Pools C and D - north end, and Fuel Transfer Canals. The new fuel pool, Pool A, and the spent fuel pool, Pool B, are interconnected by the south Fuel Transfer Canal. The Cask Loading/Unloading Pool, Pool C, and Pool D are interconnected by the north Fuel Transfer Canal. The Main Fuel Transfer Canal connects the south and north Fuel Transfer Canals.

The Spent Fuel Pool Cooling System provides safety related cooling for the new and spent fuel pools, provides adequate cooling water inventory to support the cooling function, and provides shielding via the large water inventory. The fuel pools are cooled by two independent cooling loops, either of which can remove the decay heat loads generated. In the event of a single failure in one of the Spent Fuel Cooling System loops, the other loop will provide adequate cooling. System piping removes water from a pool, passes it through a strainer, and pumps it to a heat exchanger for cooling prior to returning the water to the pool.

The portion of the Spent Fuel Pool Cooling System serving the South fuel storage facility (Pools A and B) has been designed to remove the heat loads generated by the quantities of fuel to be stored in the pools. The portion of the cooling system serving the North fuel storage facility (Pools C and D) has been designed to remove a heat load of no more than one million BTUs per hour. This limited heat load can be from spent fuel obtained from HNP or other Progress Energy nuclear plants.

The fuel pools in the Fuel Handling Building will not be affected by any loss of coolant accident in the Containment Building. The water in the pools is isolated from that in the refueling cavity during most of the refueling operation. Only a very small amount of interchange of water will occur as fuel assemblies are transferred during refueling. The fuel pool cooling pump suction line, which can be used to lower the pool water level, penetrates the Fuel Pool wall approximately 18 ft. above the fuel assemblies. The penetration location precludes uncovering the fuel assemblies as a result of a postulated suction line rupture. Piping in contact with Fuel Pool water is austenitic stainless steel; welded except where flanged connections are used to facilitate maintenance.

The Spent Fuel Pool Cooling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Spent Fuel Pool Cooling System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides adequate cooling for the new and spent fuel pools.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Spent Fuel Pool Cooling System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and
2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Spent Fuel Pool Cooling System is described in HNP FSAR Section 9.1.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Spent Fuel Pool Cooling System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0305-LR 5-G-0307-LR

Components Subject to Aging Management Review

The table below identifies the Spent Fuel Pool Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-46 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling System.

TABLE 2.3.3-46 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL POOL COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Fuel Pools Cooling Pumps	M-1 Pressure-Boundary
Fuel Pools Heat Exchanger Components	M-1 Pressure-Boundary
Fuel Pools Heat Exchanger Tubes	M-5 Heat Transfer
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary
System strainers	M-1 Pressure-Boundary M-2 Filtration

2.3.3.53 Spent Fuel Pool Cleanup System

System Description

The Spent Fuel Pool Cleanup System is part of the FSAR-described Fuel Pool Cooling and Cleanup Systems servicing Pools A and B - south end, Pools C and D - north end, and Fuel Transfer Canals. Gates are provided to isolate the pools, as needed.

The Spent Fuel Pool Cleanup System provides a means for maintaining water inventory, as well as, water quality in the fuel pools and refueling cavity. The system utilizes skimmers, filters, and a demineralizer to remove impurities and suspended solids from the water, thereby, improving water quality and clarity.

The clarity and purity of the fuel pool water is maintained when desired or necessary by passing approximately five percent of the Spent Fuel Pool Cooling System flow through a cleanup loop consisting of two filters and a demineralizer. The cleanup loop is provided to remove fission products and other contaminants from the water. The cleanup loop will normally be run on an intermittent basis as required by fuel pool water conditions. Local sample points are provided to permit analysis of demineralizer and filter efficiencies.

Spent Fuel Pool Cleanup System components include: demineralizers, filters, skimmers, skimmer pumps, connecting valves, piping and fuel pool and refueling water purification pumps. The latter pumps can take suction from and return fluid to the RWST via the SI System, transfer canal, fuel pools, or the refueling cavity. Each pump can also take suction from the Demineralized Water Storage Tank for makeup to the fuel pools and line flushing. The system includes Containment Isolation Valves. The Containment isolation function is required to maintain Containment integrity for the purification lines used to connect the Spent Fuel Pool Cleanup System to the refueling cavity.

The fuel pool gates include vertical steel gates on the new fuel pool, spent fuel pools, fuel transfer canals and cask loading pools which allow the spent fuel to be immersed at all times while being moved to its destination. They also allow each area to be isolated for drainage, if necessary, and enable new fuel to be stored dry in the new fuel pool.

The Spent Fuel Pool Cleanup System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Spent Fuel Pool Cleanup System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for SBO.

Based on the above discussion, the Spent Fuel Pool Cleanup System performs the following system intended function(s:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with SBO.

The Spent Fuel Pool Cleanup System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated station blackout events.

FSAR and Drawing References

The Spent Fuel Pool Cleanup System is described in HNP FSAR Section 9.1.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Spent Fuel Pool Cleanup System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0061-LR 5-G-0062-LR

Components Subject to Aging Management Review

The table below identifies the Spent Fuel Pool Cleanup System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-47 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cleanup System.

TABLE 2.3.3-47 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL POOL CLEANUP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.54 Spent Fuel Cask Decontamination and Spray System

System Description

The Spent Fuel Cask Decontamination and Spray System consists of a series of spray nozzles located around the periphery of the cask loading pool, a cask stand and a cask decontamination enclosure with horizontal and vertical spray nozzles, a decontamination chemical addition tank, and the pumps, valves, and piping necessary to rinse and wash a spent fuel cask with demineralized water. While the spent fuel cask is being lifted out of the cask loading pool, the decontamination rinse pump may be started to deliver demineralized water to the spray nozzles. This rinse removes pool water and prepares the cask for transfer to the cask stand and final decontamination. The cask is washed down in the cask decontamination enclosure by warm demineralized water with a mild detergent added, by the decontamination wash pump.

The cask can also be scrubbed by hand until acceptable decontamination has been achieved. A final rinse of demineralized water is then applied.

This system also contains an ultrasonic generator, an ultrasonic tank, a rinse tank, and a service sink to clean and decontaminate tools and equipment used in fuel and cask handling.

The Spent Fuel Cask Decontamination and Spray System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Spent Fuel Pool Cask Decontamination and Spray System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Spent Fuel Pool Cask Decontamination and Spray System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Spent Fuel Pool Cask Decontamination and Spray System is described in HNP FSAR Section 9.1.4.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Spent Fuel Pool Cask Decontamination and Spray System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-S-0549 S03-LR

Components Subject to Aging Management Review

The table below identifies the Spent Fuel Pool Cask Decontamination and Spray System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-48 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Cask Decontamination and Spray System.

TABLE 2.3.3-48 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT FUEL CASK DECONTAMINATION AND SPRAY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.55 Spent Resin Storage and Transfer System

System Description

The Spent Resin Storage and Transfer System sluices, collects, stores, and then transfers spent resins for dewatering and transporting to an off-site disposal facility. The system is designed to accept inputs from the following sources:

1. Secondary waste demineralizers,
2. Spent fuel pool demineralizers,
3. Recycle evaporator condensate demineralizers,
4. Recycle evaporator feed demineralizers,
5. Boron thermal regeneration demineralizers,
6. Laundry and hot shower demineralizer,
7. Waste monitor tanks demineralizer,
8. Mixed bed demineralizers (CVCS),
9. Cation bed demineralizer (CVCS),
10. Waste evaporator condensate demineralizer,
11. Filter particulates and resin fines from the Filter Backwash System, and
12. Condensate polishing demineralizers.

The influent is collected in the two low activity or two high activity Spent Resin Storage Tanks from which it is pumped to outside contractor’s liners for processing.

The Spent Resin Storage and Transfer System is designed to operate as a batch process and provides sufficient holdup capacity for average yearly input to the system.

System components include spent resin storage tanks, spent resin sluice pumps, spent resin transfer pumps, spent resin sluice filters, system piping, and instrumentation.

The Spent Resin Storage and Transfer System performs no safety related function.

The Spent Resin Storage and Transfer System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Spent Resin and Concentrates System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Spent Resin Storage and Transfer System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Spent Resin Storage and Transfer System is described in HNP FSAR Section 11.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Spent Resin Storage and Transfer System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0828-LR

Components Subject to Aging Management Review

The table below identifies the Spent Resin Storage and Transfer System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-49 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Resin Storage and Transfer System.

TABLE 2.3.3-49 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SPENT RESIN STORAGE AND TRANSFER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.56 Containment Auxiliary Equipment

System Description

Most structures contain equipment that provides auxiliary services for the structure, such as, lighting fixtures, floor drains, sump pumps, and associated piping and valves. These systems may be in scope of License Renewal because they contain components that perform one or more License Renewal intended functions. This equipment has been evaluated to identify components that support License Renewal intended functions. The applicable Containment Auxiliary Equipment is discussed below.

The Containment building includes electrical components, such as, fuses, breakers, process control boards, pressure transmitters, recorders, and video displays, and mechanical components, such as, air leak test equipment, and pressure indication components. These components are used to monitor containment internal pressure, to provide electrical protection for a non-safety related electrical circuit, and to perform pressure testing.

The primary function of the Containment Auxiliary Equipment electrical and mechanical components is to provide containment pressure monitoring signals used to initiate ESF systems. These components provide pressure values in the Control Room for a maximum available pressure range of 0 - 55 psig. Containment pressure is sensed by four physically separated differential pressure transmitters mounted by rigid supports outside of the containment. They are connected to the Containment atmosphere by a filled, sealed hydraulic transmission system. In addition, containment pressure indication is a RG 1.97, Category 1, function.

The Containment Auxiliary Equipment also contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Containment Auxiliary Equipment include components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ and SBO.

Based on the above discussion, the Containment Auxiliary Equipment performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provide Containment pressure signal for initiating ESF systems and • Provides post-accident monitoring of Containment pressure. .
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ and SBO.

The Containment Auxiliary Equipment is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

3. Components that are relied on during postulated station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

Portions of the Containment Auxiliary Equipment are described in HNP FSAR Sections 7.3.1.1.2 and Table 7.5.1-10. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Containment pressure instrumentation and supporting components associated with the Containment Auxiliary Equipment are not shown on Scoping drawings. However, a simplified schematic of the instruments and supporting components is shown on FSAR Table 6.2.4-1 for penetrations M-69 through M-72.

Components Subject to Aging Management Review

The table below identifies the Containment Auxiliary Equipment components and commodities requiring aging management review (AMR) and their intended functions.

The AMR results for these components/commodities are provided in Table 3.3.2-50 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Auxiliary Equipment.

TABLE 2.3.3-50 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT AUXILIARY EQUIPMENT

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.57 Containment Liner Penetration Auxiliary Equipment

System Description

Most structures have support systems that provide auxiliary services for the structure, such as, floor drains, sump pumps, and associated discharge piping and valves. These systems may be in scope of License Renewal because they contain components that perform License Renewal intended functions. These systems have been evaluated to identify components that support License Renewal intended functions. The applicable Containment Liner Penetration Auxiliary Equipment is discussed below.

The components that support the Containment Liner Penetration Auxiliary Equipment consist of position and pressure switches, fuses, motors, electro-hydraulic operators, valves, pumps, and pressure indicators that support operation of Containment hatches and airlocks.

Access into the Containment is provided by an equipment hatch, a personnel air lock, and an emergency air lock. A bolted cover is provided in the equipment hatch cover for passage of smaller equipment during plant operation. Provision is made to pressurize the space between the gaskets of the bolted hatch cover to meet the requirements of Appendix J of 10 CFR Part 50.

One breech-type personnel air lock and one personnel emergency air lock are provided. Each lock is a welded steel assembly having two doors which are double-gasketed with material resistant to radiation. Provisions are made to pressurize the space between the gaskets. The doors of each lock are equipped with quick-acting valves for equalizing the pressure across each door, and the doors are not operable unless pressure is equalized. There is visual indication outside each door showing whether the opposite door is open or closed and whether its valve is open or closed. Provisions have been made outside each door for remotely closing the opposite door so that in the event that one door is accidentally left open it can be closed by remote control.

Two pressure gages are placed at each end of the personnel locks, one reads from outside the lock and measures lock pressure. The other reads from inside the lock and measures containment pressure. Nozzles are installed which permit pressure testing of the locks at anytime. Doors for the lock are hydraulically sealed and electrically interlocked. Opening of the doors after unsealing will be done with a hydraulic motor, as will closing before sealing. Manual hand pump operation of the sealing ring and door swing mechanism is provided in case of a power failure. Test connections are provided for continuous testing between the double seals of each door for leakage.

The personnel emergency air lock has a door located at each end of the lock. The doors of the lock are in series and are mechanically interlocked to ensure that one door cannot be opened until the second door is sealed. Test clamps are provided for leakage and pressure testing of the personnel emergency air lock. This set of clamps fits either door and is designed to withstand, as a minimum, the full peak containment internal pressure.

This system is conservatively assumed to meet the 10 CFR 54.4(a)(1) scoping criteria because it contains components that support the containment pressure boundary function and have one or more safety related quality classifications.

The Containment Liner-Penetration Auxiliary Equipment contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

In addition, the system includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification.

Based on the above discussion, the Containment Liner Penetration Auxiliary Equipment performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Components that support the containment pressure boundary,and • Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ.

The Containment Liner Penetration Auxiliary Equipment is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Containment Liner Penetration Auxiliary Equipment is described in HNP FSAR Sections 3.8.1.1.3.3 and 3.8.2.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Liner Penetration Auxiliary Equipment are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-S-2170-LR

Components Subject to Aging Management Review

The table below identifies the Containment Liner Penetration Auxiliary Equipment components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-51 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Liner Penetration Auxiliary Equipment.

TABLE 2.3.3-51 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT LINER PENETRATION AUXILIARY EQUIPMENT

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.58 Security Building HVAC System

System Description

The Security Building HVAC System is an independent ventilation system dedicated to the Security Building. The system is classified as non-safety related and is not required for the safe shutdown of the plant.

The Security Building HVAC System operational requirements are independent from the modes of plant operation. They operate continuously to maintain the environment for mechanical and electrical equipment, and to provide comfort for operating personnel. The Security Building HVAC System is designed as once through ventilation with separate provision for heating provided by electric unit heaters. The system, except the heating components, receives electric power from the Security System Diesel Generator in the event of a loss of offsite power.

Mechanical components in this system include fans, ductwork, filters, dampers, compressors, cooling coils, chillers, heaters, valves and necessary instrumentation to support operation for personnel and equipment.

The Security Building HVAC System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The system provides ventilation for components that are relied on to provide yard lighting for performance of manual actions following a postulated fire.

Based on the above discussion, the Security Building HVAC System performs the following system intended functions:

10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Security Building HVAC System is in the scope of License Renewal, because it contains:

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The Security Building HVAC System is not described in HNP FSAR.

The License Renewal scoping boundaries for the Security Building HVAC System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0571 S10-LR

Components Subject to Aging Management Review

The table below identifies the Security Building HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-52 Auxiliary Systems – Summary of Aging Management Evaluation – Security Building HVAC System.

TABLE 2.3.3-52 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECURITY BUILDING HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary

2.3.3.59 Containment Vacuum Relief System

System Description

Protection of the containment vessel against excessive external pressure is provided by the Containment Vacuum Relief System which consists of a check valve and an automatic air-operated butterfly valve located outside Containment in each of two independent vacuum relief lines.

Actuation of the butterfly valves is controlled by differential pressure between the outside atmosphere and the containment. Safety grade differential pressure transmitters are provided, two for monitoring and two for control. One set of transmitters provide a signal for control action to open the butterfly valves when the differential pressure between the containment and outside reaches its setpoint value. The second set of transmitters, which are of a different manufacturer, provide a continuous signal to the Control Room for indication and will alarm prior to the differential pressure reaching the butterfly valve setpoint.

Both the vacuum relief check valves inside the Containment and the butterfly valves outside the Containment perform the dual safety functions of providing an open flow path for relieving negative containment pressure and providing containment pressure integrity for positive containment pressures. These valves are designed to satisfy Safety Class 2 and Seismic Category I requirements.

Since the containment vacuum relief check valves also perform as containment isolation valves in the event of a LOCA, the pneumatically operated butterfly valves are designed to fail closed. A Seismic Category I air accumulator is provided for each butterfly valve to ensure a reliable energy source for operation. The Seismic Class I air supply is isolated from the normal Non-Seismic Class I air supply system by a set of check valves which will prevent the loss of air from the accumulator in the event of failure of the non-Seismic Category I air supply system.

The Containment Vacuum Relief System includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1 requirement.

The Containment Vacuum Relief System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ and SBO.

The Containment Vacuum Relief System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Containment Vacuum Relief System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Protects the integrity of the Containment vessel by preventing excessive external pressure, • Supports the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ and SBO.

The Containment Vacuum Relief System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Containment Vacuum Relief System is described in HNP FSAR Section 6.2.1.1.3.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Vacuum Relief System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR   8-G-0517 S05-LR

Components Subject to Aging Management Review

The table below identifies the Containment Vacuum Relief System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-53 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Vacuum Relief System.

TABLE 2.3.3-53 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT VACUUM RELIEF SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Containment Vacuum Relief Accumulator Tank	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.60 Bridge Crane Equipment

System Description

The Bridge Cranes System consists of the following bridge cranes:

1. Fuel Handling Bridge Crane,
2. Fuel Handling Building Auxiliary Crane,
3. Emergency Diesel Generator Bridge Cranes A & B,
4. Reactor Containment Building Jib Cranes A & B, and
5. Miscellaneous bridge cranes in the Reactor Auxiliary Building, Waste Processing Building, and Service Building.

The Fuel Handling Bridge Crane is designated safety related.

The Bridge Crane System contains equipment that is conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

The structural parts of the Bridge Cranes System are evaluated as civil/structural components/commodities within the building or structure where they are located.

Based on the above discussion, the Bridge Crane Equipment performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Bridge Crane Equipment is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

Portions of the Bridge Crane Equipment are described in HNP FSAR Section 9.1.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Bridge Crane Equipment are not shown on the Scoping drawings.

Components Subject to Aging Management Review

Mechanical components associated with the Bridge Crane Equipment are subcomponents of the crane. Cranes are evaluated as civil structures for License Renewal. The Bridge Crane Equipment components that are subject to aging management review are electrical and civil/structural components. The screening of civil components is addressed in Section 2.4, and screening of electrical components is addressed in Section 2.5.

2.3.3.61 Containment Pressurization System

System Description

The Containment Pressurization System is used for the pressurization of the Containment during performance of Type A, Integrated Leak Rate Test (ILRT), testing. The system consists of piping which runs from the southwest corner of the Tank Area/Building through Containment Penetration M-96. Portable air compressors are connected to the piping outside of the Tank Area/Building and used to pressurize the Containment for the ILRT. Penetrations and piping are also provided for Containment Pressure Sensing and for a controlled flow release (verification flow) during the ILRT.

The Containment Pressurization System includes components required for containment isolation.

The system contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The Containment Pressurization System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for station blackout.

Based on the above discussion, the Containment Pressurization System performs the following system intended functions.

10 CFR54.4(a)(1) Functions	• Supports the containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with SBO.

The Containment Pressurization System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated station blackout events.

FSAR and Drawing References

Mechanical Containment penetrations associated with the Containment Pressurization System are shown on HNP FSAR Table 6.2.4-1, Penetrations M-34, M-62, and M-96. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Pressurization System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

6-S-0916-LR

Components Subject to Aging Management Review

The table below identifies the Containment Pressurization System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-54 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Pressurization System.

TABLE 2.3.3-54 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT PRESSURIZATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.62 Penetration Pressurization System

System Description

The Penetration Pressurization System is designed to provide a flow path for pressurizing the Containment electrical penetrations, valve chambers, equipment hatch, and air locks for testing. They are pressurized to the accident design pressure in order to determine penetration leak rate. The system uses both nitrogen and instrument air for testing. System components include valves, piping components, and flow and pressure instrumentation.

Containment electrical penetrations are pressurized continuously using nitrogen to verify integrity and to eliminate the possibility of moisture entering the internals of the penetration itself. The flow rate of the nitrogen is monitored to assure the integrity of the electrical penetrations. Each electrical penetration is designed to be isolated and tested on a individual basis if the need arises.

The Instrument Air System can supply the Penetration Pressurization System piping to permit testing of the following mechanical penetrations:

1. Emergency Air Lock,
2. Personnel Air Lock,
3. Containment Spray Valve Chambers, and
4. RHR Valve Chambers.

During testing of the mechanical penetrations, air flow is directed to the penetration where local pressure indicators monitor the penetrations pressure during testing. The flow rate of the air is monitored to assure the integrity of the mechanical penetrations.

The system contains valves within the pressure boundary for the containment penetrations and, therefore, supports the containment pressure boundary function.

The Penetration Pressurization System contains non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Penetration Pressurization System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Supports the containment isolation function.
10 CFR54.4(a)(2) Functions	• Contains components that are relied on for seismic continuity.

The Penetration Pressurization System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Penetration Pressurization System is described in HNP FSAR Sections 6.2.6.1.3 and 3.8.1.1.3.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Penetration Pressurization System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0166-LR

Components Subject to Aging Management Review

The table below identifies the Penetration Pressurization System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-55 Auxiliary Systems – Summary of Aging Management Evaluation – Penetration Pressurization System.

TABLE 2.3.3-55 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PENETRATION PRESSURIZATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.63 Containment Cooling System

System Description

The Containment Cooling System supports the Containment Heat Removal System which functions to provide the containment heat removal function required by 10 CFR 50 Appendix A, GDC-38, Containment Heat Removal. The Containment Cooling System performs the following functions:

1. During normal operation, the Containment Cooling System is designed to maintain the indicated containment temperature below 120°F,
2. In the event of a design basis accident, containment fan coolers are designed to remove heat, and
3. In the event of a design basis accident, containment fan coolers are designed to assist in mixing the containment atmosphere.

The Containment Cooling System consists of four safety related fan cooler units and three non-safety fan coil units. Following a design basis accident only the safety related fan cooler units are required to operate. During normal power operation, safety related units operate in conjunction with the non-safety related fan coil units to maintain the required containment temperature.

Each of the safety related Containment Fan Cooler Units consists of a service water cooling coil section and two fans. A gravity damper is provided at the discharge side of each fan to prevent airflow in the reverse direction when only one fan per unit is required to operate. Both fans of the unit discharge into a common duct which is connected to a concrete airshaft. A branch duct connection has been provided upstream of the shaft isolation damper to serve as a post-accident discharge nozzle and is normally isolated by means of a pneumatically operated, fail-open damper. When in operation, air is drawn from containment space, through the cooling coils, to the fan suction. The fan discharge is directed to either the concrete shaft or the post-accident nozzles, depending on the operation mode. By means of a ductwork distribution network, air is supplied to the steam generator and pressurizer sub-compartments, the operating floor, the ground floor, the instrument room, and the containment dome. A portion of the fan discharge is tapped to serve the Reactor Supports Cooling System, the Digital Rod Position Indication Cabinets, and the Primary Shield Cooling System. Other areas of containment are cooled by natural convection.

Each of the non-safety related Containment Fan Coil Units consists of a service water cooling coil and two fans. Each fan has an air operated discharge damper to isolate the fan not in operation. Both fans discharge into common ductwork. When in operation, air is drawn from containment space, through the cooling coils, to the fan suction. Cooling air from the fan coil unit is directed to the RCP sub-compartments.

The Containment Cooling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Containment Cooling System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection and EQ.

Based on the above discussion, the Containment Cooling System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Removes heat from the Containment following a design basis accident, and • Mixes the Containment atmosphere following a design basis accident.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The Containment Cooling System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Containment Cooling System is described in HNP FSAR Sections 6.2.2 and 7.3.1.3.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Cooling System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR

Components Subject to Aging Management Review

The table below identifies the Containment Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-56 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Cooling System.

TABLE 2.3.3-56 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Containment Fan Cooler - Cooling Coil	M-5 Heat Transfer
Containment Fan Cooler - Housing	M-1 Pressure-Boundary
Containment Fan-Coil - Housing	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.64 Airborne Radioactivity Removal System

System Description

The Airborne Radioactivity Removal System is designed to remove airborne particulate radioactivity in the containment atmosphere by recirculating the atmosphere through HEPA filters and charcoal adsorbers to permit personnel entry.

The Airborne Radioactivity Removal System consists of two recirculating airborne radioactivity removal units - one operating and one stand-by. Each unit includes a medium efficiency filter bank, a HEPA filter bank, a charcoal adsorber bank, and a centrifugal fan. The airborne radioactivity removal unit is operated on a continuous basis to limit the build up of airborne radioactivity which might leak from the RCS during normal operation.

The Airborne Radioactivity Removal System is not a safety related system and is not required to operate during accident conditions. Upon a loss of power, the system will be shutdown.

The Airborne Radioactivity Removal System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Airborne Radioactivity Removal System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Airborne Radioactivity Removal System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Airborne Radioactivity Removal System is described in HNP FSAR Section 9.4.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Airborne Radioactivity Removal System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR

Components Subject to Aging Management Review

The table below identifies the Airborne Radioactivity Removal System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-57 Auxiliary Systems – Summary of Aging Management Evaluation – Airborne Radioactivity Removal System.

TABLE 2.3.3-57 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AIRBORNE RADIOACTIVITY REMOVAL SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.65 Containment Atmosphere Purge Exhaust System

System Description

The Containment Atmosphere Purge Exhaust System is designed to perform the following functions:

1. Maintain low concentration of radioactivity in the containment atmosphere by continually purging the Containment with a low volume of outside air and allow the system to draw down the containment atmosphere to a slight negative pressure,
2. Reduce the concentration of radioactivity in the containment atmosphere to an acceptable level by purging the containment with a high volume of outside air to permit personnel access, and

3. Provide for control of combustible gases in Containment. The hydrogen purge function is considered as a backup for the redundant hydrogen recombiners and is not relied upon for safety.

The Containment Atmosphere Purge Exhaust System consists of three subsystems, the Normal Containment Purge System, the Containment Pre-Entry Purge System, and the Hydrogen Purge System.

The Normal Containment Purge System is an in-line system used for low flow purge during normal power generation periods. Air is drawn from the discharge portion of the Airborne Radioactivity Removal System located in the Containment to the RAB Normal Exhaust Filter System. The Normal Containment Purge supply line is 8 in. diameter and is isolated from the Containment Pre-entry Purge System by means of pneumatically-operated butterfly valves and dampers. Purge air is discharged to the atmosphere through the vent stack via the RAB Normal Exhaust Systems. Make-up air is supplied by an additional 8 in. line via the Normal Containment Purge Make-up system Containment penetration. The Normal Containment Purge Make-up unit includes a medium efficiency filter bank, an electric heating coil and two centrifugal fans (one operating and one standby). The 8 in. diameter isolation valves provide automatic containment isolation following a postulated design basis event.

The Containment Pre-Entry Purge System is used for high flow purge rates just prior to and during the refueling operation or other extended activity in the Containment Building. The Containment Pre-Entry Purge System is used during power generation as a backup to the RAB Normal Exhaust System. The Containment Pre-Entry Purge System exhaust unit includes an isolation damper, a medium efficiency filter bank, a HEPA filter section, a charcoal adsorber section, another isolation damper, and two centrifugal exhaust fans - one operating and one in standby. Air is discharged to atmosphere through a vent stack. The Containment Pre-Entry Purge System is automatically secured upon receipt of a Containment Ventilation Isolation Signal (CVIS), a high radiation signal from the Containment Pre-Entry Purge Radiation Monitor, or a Control Room Isolation Signal (CRIS).

The Containment Hydrogen Purge System is provided as a backup means of controlling hydrogen inside the Containment Building. It provides a means of purging the hydrogen from the Containment and is intended as a backup to the Hydrogen Recombiner System. The system consists of a purge make-up penetration line, an exhaust penetration line, and a filtered exhaust system.

Post-Accident Hydrogen purge system, up to the first isolation valve outside Containment, is Safety Class 2, Seismic Category I, and is designed to retain its integrity following a design basis loss-of-coolant accident. The remainder of the system is not designed for safety design basis since it serves as a backup system to the hydrogen recombiners. The system is designed to exhaust the air and hydrogen from the Containment and replace it with air from the outside. Functional and operational redundancy of the system is not provided, as the system serves only as a diverse means of backup to the already redundant containment hydrogen recombiners; however, the system is capable of controlling hydrogen inside Containment following a LOCA independent of operation of the recombiners.

The Containment Atmosphere Purge Exhaust System is not safety related and is not required to operate under accident conditions. Upon loss of power, the system will shut down. The containment isolation valves are air-operated, fail closed.

The Containment Atmosphere Purge Exhaust System includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1 requirement.

The Containment Atmosphere Purge Exhaust System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Containment Atmosphere Purge Exhaust System meets the scoping criteria for fire protection, EQ, and SBO.

Based on the above discussion, the Containment Atmosphere Purge Exhaust System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Isolates Containment to prevent release of radioactive materials, • Supports the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Containment Atmosphere Purge Exhaust System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires and station blackout events,

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Containment Atmosphere Purge Exhaust System is described in HNP FSAR Sections 9.4.7.2.2 and 6.2.5.1.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Containment Atmosphere Purge Exhaust System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the Containment Atmosphere Purge Exhaust System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-58 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Atmosphere Purge Exhaust System.

TABLE 2.3.3-58 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Containment Purge Cooling Coil Housing	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.66 Control Rod Drive Mechanism Ventilation System

System Description

The Control Rod Drive Mechanism (CRDM) Ventilation System is a forced air cooling system that provides a reliable supply of cooling air to the CRDM magnetic coil housing during normal reactor operation. The system draws containment air into a plenum area above the CRDM assemblies and down over the faces of the coil housings. The air exits below the coil housing and across the upper surface of the reactor vessel head via a return duct to centrifugal fans which exhaust to the containment atmosphere. The system consists of four 50-percent capacity centrifugal fans mounted on the upper section of the shroud structure. Internal baffles provided between the cooling shroud and the outer row of mechanisms along with dummy CRDM cans, which occupy positions which do not contain mechanisms, create an exhaust plenum between the reactor vessel head and the lower mechanism coil housings. Ducts located inside the shroud structure direct air from this plenum up to and through the fans located on the upper portion of the shroud structure.

In the unlikely event of a complete loss of CRDM cooling air, overheating will eventually result in shorting of the CRDM coils and tripping of the rods. This is not a safety related problem since these coils do not perform a safeguards function.

The fans are not required to operate during a LOCA or MSLB; therefore, this system is not a safety related system.

The CRDM Ventilation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the CRDM Ventilation System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The CRDM Ventilation System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The CRDM Ventilation System is described in HNP FSAR Section 9.4.8. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the CRDM Ventilation System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR

Components Subject to Aging Management Review

The table below identifies the CRDM Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-59 Auxiliary Systems – Summary of Aging Management Evaluation – Control Rod Drive Mechanism Ventilation System.

TABLE 2.3.3-59 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTROL ROD DRIVE MECHANISM VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Rod Drive Cooling System Screens	M-2 Filtration

2.3.3.67 Primary Shield and Reactor Supports Cooling System

System Description

The Primary Shield and Reactor Supports Cooling System is designed to supply cooling air to the annular clearance between the reactor vessel and primary shield wall, the reactor vessel supports and the annular space between the reactor coolant legs and the concrete wall. The Primary Shield and Reactor Supports Cooling System is a sub-system of the Containment Heat Removal System.

The Primary Shield Cooling portion of the system consists of two, Safety Class 3, 100-percent capacity, direct-driven supply fans. Each fan serves as a standby for the other fan and is provided with a locked open inlet damper and a gravity type discharge damper to prevent back flow through the standby fan. Each axial supply fan draws cool air from the vertical concrete air shaft and supplies it to the annular clearance between the reactor vessel and primary shield wall through connecting ductwork. The cooling provided by the Primary Shield Cooling System minimizes the possibility of concrete dehydration.

The Reactor Supports Cooling portion of the system consists of two, Safety Class 3, 100-percent capacity direct-driven vane axial fans. Each fan serves as a standby for the other fan and is provided with a locked open inlet damper and a gravity type discharge damper to prevent back flow through the idle fan. The system draws cooling air from the vertical concrete air shaft and supplies air to the reactor vessel supports and to the annular space between reactor coolant legs and sleeves through the primary shield. Cool air is forced through these spaces uniformly by means of a ductwork distribution system. The cooling provided by the Reactor Supports Cooling System limits thermal expansion of the reactor vessel supporting steelwork.

The Primary Shield and Reactor Supports Cooling System includes fans, fan motors, dampers, and instrumentation and controls.

Failure of the Primary Shield and Reactor Supports Cooling System could inhibit the function of a safety related SSC. However, failure of either the primary shield or the reactor supports cooling subsystem would result in a plant shutdown.

The Primary Shield and Reactor Supports Cooling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Primary Shield and Reactor Supports Cooling System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Primary Shield and Reactor Supports Cooling System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Primary Shield and Reactor Supports Cooling System is described in HNP FSAR Section 6.2.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Primary Shield and Reactor Supports Cooling System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR

Components Subject to Aging Management Review

The table below identifies the Primary Shield and Reactor Supports Cooling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-60 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Shield and Reactor supports Cooling System.

TABLE 2.3.3-60 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: PRIMARY SHIELD AND REACTOR SUPPORTS COOLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Damper Housings	M-1 Pressure Boundary
Ducting and components	M-1 Pressure Boundary
Ducting closure bolting	M-1 Pressure Boundary
Elastomer seals and components	M-1 Pressure Boundary
Fan Housings	M-1 Pressure Boundary

2.3.3.68 Fuel Cask Handling Crane System

System Description

The Fuel Cask Handling Crane System is part of the Fuel Handling System.

The Fuel Cask Handling Crane transfers the spent fuel cask between the cask transport railroad car and the spent fuel cask loading pool. The design of the Fuel Handling Building and the Fuel Cask Handling Crane prevents the possibility of the cask passing over or falling into any fuel pool.

The Fuel Cask Handling Crane System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Fuel Cask Handling Crane System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Fuel Cask Handling Crane System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Fuel Cask Handling Crane System is described in HNP FSAR Section 9.1.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The portion of the Fuel Cask Handling Crane System within scope consists of electrical and civil components. These are not shown on Scoping drawings.

Components Subject to Aging Management Review

Mechanical components associated with the Fuel Cask Handling Crane are subcomponents of the crane. Cranes are evaluated as civil structures for License Renewal. The electrical components of the Fuel Cask Handling Crane System are non-safety related motors. Therefore, the Fuel Cask Handling Crane System components and commodities requiring AMR consist of non-safety related civil components and supports for non-safety related electrical components. Both of these are considered to be civil commodities and are screened in Section 2.4.

2.3.3.69 Reactor Auxiliary Building Ventilation System

System Description

The Reactor Auxiliary Building Ventilation System serves the RAB and includes the RAB Normal Ventilation System, RAB Switchgear Rooms Ventilation System, RAB ESF Equipment Cooling System, RAB Electrical Equipment Protection Room Ventilation System, RAB Emergency Exhaust System, RAB Non-Nuclear Safety Ventilation System, and the RAB Computer and Communication Rooms Ventilation System.

The Reactor Auxiliary Building Ventilation System is designed to provide cooling, heating, ventilation, differential pressure control, and radiological habitability control for the RAB and consists of the following systems:

1. The RAB Normal Ventilation System (RABNVS) provides ventilation for the RAB during normal plant operation. The once through type system consists of a supply system and an exhaust system. Under accident conditions, spaces containing major Containment penetrations and selected potentially contaminated areas are automatically isolated, the normal ventilation system shuts down, and the air from those areas is treated by the filtered RAB Emergency Exhaust System prior to release to the environment.

   The RABNVS supply system consists of an outside air intake equipped with a self acting tornado damper, a medium efficiency filter, an electric heating coil, an air washer, and two fans. In addition to the supply system, the CVCS chiller area and the 480V auxiliary bus area are cooled by fan coolers. The RABNVS exhaust system consists of two subsystems, each having a pneumatic inlet damper, medium efficiency filter, HEPA filter, charcoal adsorber and a centrifugal fan with variable inlet vanes. Air is exhausted from the RABNVS through a vent stack located on the roof of the RAB. Isolation dampers at the RAB emergency exhaust boundary located in the normal ventilation supply and exhaust ductwork are safety related. Upon receipt of an SIS, the isolation dampers will close to prevent potential release of radioactivity from these areas. The RABNVS (supply and exhaust systems), except for the isolation dampers and associated ductwork, is not required to operate during accident conditions.

2. The RAB Emergency Exhaust System maintains selected potentially contaminated areas of the RAB below atmospheric pressure following an SI Signal (SIS) and minimizes unfiltered outleakage of airborne radioactive materials. This system consists of redundant fan and filter subsystems. Each of the two subsystem filter trains includes a valve, decay heat cooling air connection, demister, electric heating coil, medium efficiency filter, HEPA pre-filter, charcoal adsorber and HEPA after-filter. Connected to each filter train outlet is a fan with a valve on its inlet and a backdraft damper on its outlet to prevent reverse airflow through the inactive fan.

   Upon receipt of a SIS, air operated valves on the normal ventilation penetrations into the areas containing equipment essential for safe shutdown close, and both RAB Emergency Exhaust fans are automatically energized. Either unit may then be manually deenergized from the Control Room, and placed in standby. The system is safety related and designed to maintain the post-accident radiological releases within the guidelines of 10CFR 50.67.

3. The RAB Non-Nuclear Safety Ventilation System consists of two Heating and Ventilating Equipment Room subsystems (north and south). Each subsystem consists of an outside air intake plenum, medium efficiency filter, electric heating coil, chilled water cooling coil and centrifugal supply and return fans. The system is capable of functioning as a once through or as a mixed (recirculation with makeup) system. The chilled water for the cooling coil is supplied from the ESCWS. The RAB Non-Nuclear Safety Ventilation System is not safety related. The system is not required to operate during accident conditions.

4. The RAB ESF Equipment Cooling System provides emergency cooling by means of fan coolers, for areas containing equipment essential for safe shutdown. The system consists of cooling systems for various ESF equipment areas and a Steam Tunnel ventilation system. Each cooling system includes an air handling unit, which consists of a fan section, a cooling coil section and a filter section. Chilled water for the cooling coils is supplied from the ESCWS. Air is drawn from each room through the fan cooler and discharged to the space it serves. The Steam Tunnel Ventilation System consists of two in line fans with independent ductwork and louvers. Air is drawn from outside through louvers and supplied to the Steam Tunnel through a ductwork distribution system. The ESF fan-coolers are required to operate during accident conditions in order to maintain an acceptable operational environment for the ESF equipment located in the areas served. The Steam Tunnel post-LOCA cooling requirements may be satisfied by the operation of either fan. This system is considered an ESF ventilation system.

5. The RAB Switchgear Rooms Ventilation System (RABSRVS) serves the RAB Switchgear Rooms, Battery Rooms, and the Process Instrument Cabinet Room "A". Each Switchgear Room has its own independent air conditioning system. Each RABSRVS consists of a missile protected air intake, equipped with self-acting tornado damper, medium efficiency filter, electric heating coil, two 100-percent redundant chilled water cooling coils connected in series, and two redundant fans arranged in parallel. The outside air intake valves are closed to ensure that the Switchgear Room will not become pressurized, which could adversely impact the required pressurization of the Control Room. This system is required to operate during both normal and accident conditions to maintain an acceptable operational environment for the safety related equipment located in each Switchgear Room Area. This system is considered an ESF ventilation system. The Battery Room exhaust system consists of two redundant fans. Sufficient air will be exhausted from each Battery Room of the Switchgear Room Areas to prevent the accumulation of combustible concentrations of hydrogen. During the post-LOCA mode of operation, upon generation of a CRIS, the ventilation system reverts to 100-percent recirculation with the exhaust fans off. The RABSRVS supply fans and the battery room exhaust fans are supplied with onsite emergency power from the EDGs in the event of loss of offsite power. The chilled water for cooling coils of air handling units is supplied from the ESCWS.

   The Process Instrument Cabinet Room "A" standby cooling system was installed to serve as a backup to the normal ventilation system that provides ventilation to the room and maintains its temperature. It is postulated that the normal ventilation system will be lost as a result of certain fire scenarios that cause fire dampers in the normal ventilation ducts to fail closed. This standby cooling system consists of a fan cooler unit, fan, evaporator coil, and an air-cooled condenser located on the roof of the RAB. When the system is operating, the fan circulates cool air to the Process Instrument Cabinet "A" Room. The system is normally in service, but will not operate unless the temperature in the room reaches 82°F. The system will automatically start in the event fire interrupts normal ventilation to the room.

6. The RAB Electrical Equipment Protection Room Ventilation System has two redundant trains that share the same ductwork. The system consists of two 100-percent capacity subsystems in parallel. One subsystem is normally-operating and one-is in standby. Each supply subsystem consists of a motorized inlet damper, medium efficiency filter, chilled water cooling coil, supply fan, gravity damper and electric heating coil. The exhaust subsystem consists of redundant fans. The exhausted air is discharged to the atmosphere through a missile protected valve.

   During normal operation, a small portion of outside air is drawn through the system, mixed with a large portion of return air and supplied to the served areas.

During a LOCA condition, all air is recirculated through the system. The ventilation supply and exhaust subsystems are supplied with emergency power from the EDGs in the event of loss of offsite power. The cooling coils are supplied with chilled water from the ESCWS. This system is required to operate during both normal and accident conditions to maintain an acceptable operational environment for the safety related equipment located in each Electrical Equipment Protection Room. This system is considered an ESF ventilation system.

7. The RAB Computer and Communication Rooms Ventilation System consists of the Computer and Communication Rooms HVAC system and the Battery and HVAC Equipment Room HVAC system. The areas served are located on elevation 305 ft. of the RAB and in a superstructure on the RAB roof. The system maintains areas at the proper design temperature and pressure for suitable operation of equipment, reduces the consequences of a radiological accident, removes smoke in case of fire and provides ventilation for hydrogen removal near batteries.

   The Computer and Communication Room Ventilation System includes an outside air intake with isolation valves, electric preheat coil for smoke purge operation, one medium efficiency filter, two cooling coils installed in series, two fans and discharge dampers. The ducts penetrating the RAB roof have Seismic Category I self-acting tornado dampers. The exhaust subsystem includes a purge fan for smoke removal and air filtration consisting of a medium efficiency filter, a HEPA pre-filter, a charcoal adsorber, a HEPA after-filter and two fans. The Battery and HVAC Equipment Room HVAC System includes an outside air intake, dampers, medium efficiency filters, electric heating coil, two cooling coils, two fans, refrigerant piping, two condensing units mounted on the RAB roof and room ventilators. This system is non-safety related, except that the duct penetrations to the RAB are provided with Seismic Category I tornado dampers to protect the RAB.

The RAB Ventilation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The RAB Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ and fire protection.

Based on the above discussion, the RAB Ventilation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• The RAB Emergency Exhaust System maintains selected potentially contaminated areas of the RAB below atmospheric pressure and minimizes unfiltered outleakage of airborne radioactive materials. • The RAB ESF Equipment Cooling System provides emergency cooling for areas containing equipment essential for safe shutdown. • This RAB Switchgear Rooms Ventilation System maintains an acceptable operational environment for the safety related equipment located in each Switchgear Room Area. • This RAB Electrical Equipment Protection Room Ventilation System maintains an acceptable operational environment for the safety related equipment located in each Electrical Equipment Protection Room.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection and EQ.

The RAB Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

<u>FSAR and Drawing References</u>

The RAB Ventilation System is described in Sections 6.5.1, 9.4.3, 9.4.5, and 9.4.9 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the RAB Ventilation System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

8-G-0517-LR	8-G-0517 S02-LR	8-G-0517 S03-LR
8-G-0517 S05-LR	8-G-0517 S06-LR	8-G-0532 S05-LR

Components Subject to Aging Management Review

The table below identifies the RAB Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-61 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Auxiliary Building Ventilation System.

TABLE 2.3.3-61 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housing	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary
Reactor Auxiliary Building Non-Safety Related Cooling Coil Housings	M-1 Pressure-Boundary
Reactor Auxiliary Building Safety Related Cooling Coil Housings	M-1 Pressure-Boundary
Reactor Auxiliary Building Safety Related Cooling Coils	M-5 Heat Transfer

2.3.3.70 Emergency Service Water Intake Structure Ventilation System

System Description

The ESW Intake Structure Ventilation System is located in the ESW & CT Makeup Intake Structure and consists of the Electric Equipment Room HVAC System and the Emergency Pump Room Ventilation System. This safety related system is designed to maintain the temperature in each electrical Motor Control Center (MCC) Room at a maximum of 116°F and an Emergency Pump Room at a maximum of 122°F. This system is considered an ESF ventilation system.

The Electric Equipment Room HVAC System consists of two air handling units, one for each of two electrical MCC Rooms. Each air handling unit consists of medium efficiency filters, an electrical heating coil, a permanently isolated service water cooling coil, and a centrifugal fan. The system operates during emergency conditions and summer conditions. During winter conditions, the system can be manually started as required. An electrical unit heater for each room is also provided for supplemental heating in winter as needed. The air handling unit fans for this system do not provide any safety function. Based on testing, the fans are not required to maintain equipment temperatures within limits. However, the fans are available to perform the ESF function and also are relied on to provide air flow to the non-safety Emergency Response Facility Information System (ERFIS) Multiplex Cabinets and for a non-safety heating function. Intake air is drawn from outside through a missile-protected louver and supplied to the MCC room. Exhaust air is relieved to the atmosphere through a missile protected louver. The air from the MCC room is returned to the air handling unit for recirculation when the outside air temperature is less than 73°F. A high room temperature alarm is provided in the Control Room.

The Pump Room Ventilation System operates during emergency conditions and can be started manually as required during normal conditions. The system consists of two exhaust systems; each system exhausts and ventilates a single pump room. The exhaust unit consists of an inline fan with a gravity discharge damper. Intake air is drawn from outside through missile protected louvers to the Emergency Pump Room and discharged to atmosphere through a missile-protected louver. Four electric unit heaters are provided for each pump room to maintain the room temperature.

In the event of loss of offsite power, this system is powered from the EDGs. A single active failure in this system can affect only one of the two MCC Rooms or Pump Rooms. Therefore, one pump is available to mitigate the consequences of a design basis accident and to provide safe plant shutdown.

The ESW Intake Structure Ventilation System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

The ESW Intake Structure Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the ESW Intake Structure Ventilation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Is available to maintain the temperatures in the Electrical MCC Room and Emergency Pump Room within limits.
10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to met the criteria of 10 CFR 54.4(a)(2) based on their quality classification.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The ESW Intake Structure Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The ESW Intake Structure Ventilation System is described in HNP FSAR Section 9.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the ESW Intake Structure Ventilation System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0548-LR

Components Subject to Aging Management Review

The table below identifies the ESW Intake Structure Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-62 Auxiliary Systems – Summary of Aging Management Evaluation – Emergency Service Water Intake Structure Ventilation System.

TABLE 2.3.3-62 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary

TABLE 2.3.3-62 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Elastomer seals and components	M-1 Pressure-Boundary
Emergency Service Water Intake Structure Cooling Coil Enclosures	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.71 Turbine Building Area Ventilation System

System Description

The Turbine Building (TB) Area Ventilation System provides ventilation, cooling, heating, and filtration for the enclosed areas in the Turbine Generator Building. The system also provides filtration and air purge of the exhaust air from potentially contaminated areas and the capability to vent and purge smoke from areas which have a potential for smoke conditions.

The following subsystems make up the TB Area Ventilation System:

1. The Condensate Polishing Demineralizers Area Ventilation System provides heating and ventilation for spaces in the condensate polishing demineralizer areas, corridor areas, and the Heating & Ventilating Equipment Room. The system is a once-through type and consists of a supply system and a filtered exhaust system. The supply system includes an outside air intake louver with bird screen and evaporative air cooler. The evaporative air cooler includes a damper, a medium efficiency filter, an electric heating coil, an air washer and two 100-percent capacity fans, arranged in parallel. The exhaust system includes a medium efficiency filter, HEPA filter, charcoal adsorber, and two 100-percent capacity fans, arranged in parallel. Air is continuously exhausted from the potentially contaminated spaces of the condensate polishing demineralizer area, through the filter system and discharged to the TB Vent stack, which is monitored by a wide range noble gas monitor. Upon detection of smoke in the system, the supply fans will automatically be tripped to prevent the spread of smoke and reduce the supply of air to the fire.

2. The Electrical and Battery Room Ventilation System provides heating and ventilation for the Electrical Equipment Room and Battery Room. The system, consisting of supply and exhaust units, is a once-through type during summer

operation and employs an economizer cycle type during the winter season. A supply unit includes an outside air intake louver with bird screen, damper, a medium efficiency filter, electric heating coil and two 100-percent capacity fans, arranged in parallel. Exhaust fans are provided for the Battery Room, and air from the Electrical Equipment Room is discharged to atmosphere through louvers. The exhaust system for the Battery Room consists of two 100-percent fans. A large portion of air from the Electrical Equipment Room is returned to the air handling unit for recirculation during winter conditions. Upon detection of smoke in the system, the supply fans will automatically be tripped to prevent the spread of smoke and reduce the supply of air to the fire.

3. The General Service Switchgear Room Ventilation System provides heating and ventilation for the TB Switchgear Room. The ventilation system for the Switchgear Room is a once-through type during summer operation and an economizer cycle during winter operation. The system consists of a supply unit which includes an outside air intake louver with bird screen, an isolation damper, a medium efficiency filter, electric heating coil and two 100-percent capacity fans arranged in parallel. Air is supplied to the Switchgear Room and discharged to the atmosphere through air-operated dampers. Some air from either the Switchgear Room or the vicinity of Turbine is returned to the air handling unit for recirculation during winter. The Cable Spreading Room is ventilated by the same supply unit for the Switchgear Ventilation System. Air is supplied to the area and discharged to the atmosphere through a louver located in the Switchgear Room.

4. The Condensate Vacuum Pump Effluent Treatment System provides filtered exhaust for the Condensate Vacuum Pump. It is a non-nuclear-safety, non-seismic-Category I designed ventilation cleanup system. The treatment system includes a demister, an electric heating coil, a HEPA pre-filter, charcoal adsorber, HEPA after-filter and two 100-percent capacity fans arranged in parallel. When the Condensate Vacuum Pump Effluent Treatment System is in use, air is drawn from the condensate vacuum pump discharge line through the treatment system and released to the TB Vent stack through a ductwork connection.

5. The Elevator Machinery Room Ventilation System and Sampling Room HVAC System provide ventilation and heating for the Elevator Machinery Room and heating and ventilation for the Secondary Sampling Room. The system consists of a sidewall fan with backdraft damper, two filtered outside air intake louvers with backdraft dampers, and an electric unit heater. In the summer, a thermostat energizes the fan, which draws air through the louver dampers and discharges it to the outside. In the winter seasons, supplementary heating is provided by an electrical unit heater located in the Elevator Machine Room. The Sampling Room HVAC System consists of electric wall heaters and a wall exhaust fan. In the winter season, the Sampling Room is heated by an electric wall heater and ventilation air is drawn in from outside through louvers by a wall exhaust fan.

6. The Secondary Sampling Equipment Enclosure System provides cooling for the Secondary Sampling Equipment Enclosure. The system consists of two four-ton split system air conditioning units. The two air conditioning units start in sequence according to the demand of the thermostat. They operate in a recirculation mode.

7. The TB Decontamination Facility HVAC System is designed to: (1) provide heating, ventilating and cooling for personnel comfort during plant normal operation, (2) provide potentially contaminated areas with once through ventilation, (3) provide smoke purge in the event of a fire, and (4) provide redundant fans to assure continuous reliable operation. The system serves the Health Physics Rooms, Health Physics Office, Decontamination Rooms, Locker Rooms, Corridors, and Vestibule. The system is not safety related and is not required to operate during accident conditions.

   The supply air portion of the TB Decontamination Facility HVAC System includes outside air and return air dampers, an air handling unit consisting of a mixing box, medium efficiency filters, electric heating coil, direct expansion refrigerant cooling coil, centrifugal fan, and flow element. An air-cooled refrigerant condensing unit is provided and is connected to the cooling coil by means of refrigerant piping. The exhaust portion of the system consists of two redundant fans and associated air inlet manual shutoff dampers and air discharge gravity dampers. The smoke purge portion consists of one smoke exhaust fan with a manual inlet shutoff damper and a discharge gravity damper.

The TB Area Ventilation System is not safety related. The system is not required to operate during accident conditions. Upon a loss of power, the system will shut down. The TB Area Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the TB Area Ventilation System performs the following system intended functions:

10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The TB Area Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are relied on during postulated fires.

FSAR and Drawing References

The TB Area Ventilation System s described in HNP FSAR Sections 9.4.4 and 9.4.10. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the TB Area Ventilation System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

8-G-0548 S02-LR 8-G-0562-LR

Components Subject to Aging Management Review

The table below identifies the TB Area Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-63 Auxiliary Systems – Summary of Aging Management Evaluation – Turbine Building Area Ventilation System.

TABLE 2.3.3-63 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING AREA VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.72 Waste Processing Building HVAC System

System Description

The Waste Processing Building (WPB) HVAC System provides ventilation and heating to the WPB Areas. The system includes a filtered exhaust system for the potentially contaminated areas, to reduce the off-site airborne radioactivity during the normal operation of the plant. The system provides for detection and control of the spread of smoke in the different areas of the WPB.

The WPB HVAC System consists of the following:

1. The Waste Processing Areas Ventilation System provides ventilation for the WPB areas during normal plant operation. The major part of the system is a once-through type for the contaminated areas. A small portion of the system serving the non-contaminated areas is an economizer cycle which blends outside air and return air as required. Included are a supply system, a filtered exhaust system for the contaminated areas and a return exhaust system for the non-contaminated areas. The supply system consists of evaporative air coolers (typically not used) connected to a common outside intake provided with intake louvers and bird screens. An air cooler includes a medium efficiency filter, electric heating coil, air washer and two 100-percent capacity fans. The fans discharge to a common plenum and continuously supply conditioned air to various spaces. The supply system is supplemented by nine recirculation fan coil units and one chilled water booster cooling coil unit. Each fan coil unit includes a medium efficiency filter with screen, a chilled water cooling coil and a fan. The cooling coils are supplied with chilled water from the Non-Essential Services Chilled Water System.

   The filtered exhaust consists of four filtered subsystems including dampers, medium efficiency filter, HEPA filter, charcoal adsorber and a fan. Air is continuously exhausted from contaminated areas and discharged to a vent stack located on the roof of the WPB. The non-filtered exhaust system for the non-contaminated areas consists of three subsystems consisting of two 100-percent capacity fans. During hot weather conditions, air will be exhausted from selected rooms to the vent stack located on the WPB roof. During cold weather conditions, air from the clean areas is mixed with incoming outside air.

2. The WPB Control Room HVAC System provides heating, ventilation, and air conditioning for personnel comfort and safety and equipment and controls functional protection. The system includes two 50-percent capacity units consisting of a common outside air intake plenum, a return outside air mixing section with dampers, medium efficiency filters, electric heating coil, chilled water cooling coil, electric reheat coil, and a fan. Air is drawn through the system, mixed with the return air and supplied to the WPB Control Room. The cooling

coil is supplied with chilled water from the Non-Essential Services Chilled Water System. Portions of the air will be transferred to the corridor areas and exhausted by the filtered exhaust system of the Waste Processing Areas Ventilation System or returned to the air handling units.

3. The Personnel Handling Facility HVAC System provides heating, ventilating, and air conditioning for selected WPB areas. The system consists of an outside air intake plenum, dampers, medium efficiency filters, electric heating coil, chilled water cooling coil and a fan. The conditioned air is supplied to areas such as the locker room, monitor areas, operating area, health physics work area, storage and wash rooms in the WPB. Electric zone reheat coils are located in the supply ducts to maintain proper supply air temperature. Air is exhausted and discharged to a vent stack located on the roof of the WPB by an exhaust fan. The cooling coil is supplied with chilled water from the Non-Essential Services Chilled Water System.

4. The Office and Laundry Areas HVAC System provides heating, ventilating and air conditioning for three subsystems:

   a. The Laundry Dryer Supply System is a once-through system providing makeup air, heating and ventilating to the cold laundry area. The supply system consists of six supply fans sharing a common outside air intake with a prefilter section and common supply air ductwork. The common outside air intake section consists of a louver with bird screen, isolation damper and an air casing with medium efficiency filters. Air is drawn from the filter casing through dampers and an electric heating coil. Air is exhausted by an external booster fan and discharged through a common duct to the vent stack located on the WPB roof.

   b. The Laundry Facility Air Conditioning System is a once-through system consisting of an air handling unit and a zone reheat coil. The air handling unit draws 100-percent outside air and supplies air to the hot and cold laundry area and HVAC Equipment Room. The air handling unit includes dampers, a medium efficiency filter, an electric heating coil, a chilled water cooling coil, and a fan. The cooling coil is supplied with chilled water from the Non-Essential Services Chilled Water System. Air from the hot and cold laundry area is exhausted and discharged to the vent stack on the roof by an exhaust fan.

   c. The Office Areas Air Conditioning System consists of an air handling unit, a recirculating fan and electric zone reheat coils. The air handling unit includes a mixing section with dampers, a medium efficiency filter, an electric heating coil, a chilled water cooling coil, and a fan. The cooling coil is supplied with chilled water from the Non-Essential Services Chilled Water System. During normal conditions, a portion of the air from the office areas is returned to the air handling unit and mixed with the outside air for recirculation. During an abnormal condition, such as smoke, air from the office areas will be exhausted and discharged to the vent stack.

5. The Laboratory Areas HVAC System provides heating ventilating and air conditioning for areas in the laboratory areas and ventilation for the fume hoods. The system consists of three supply units for all the fume hoods and an air handling unit for laboratory areas. Each fume hood supply unit includes dampers, medium efficiency filters, an electric heating coil and a fan. The air handling unit includes dampers, a medium efficiency filter, electric heating coil, chilled water cooling coil and a fan. Electric zone reheat coils are located in the supply ducts of the air conditioning system to maintain proper supply air temperature. Air from the laboratory areas is exhausted and discharged to the vent stack located on the roof of the WPB by exhaust fans. Each fume hood is provided with an exhaust fan and air is discharged to the vent stack. The cooling coil of the air handling unit is supplied with chilled water from the Non-Essential Services Chilled Water System.

6. Instrumentation and Control Shop HVAC System provides ventilation for personnel comfort, personnel safety protection. and equipment functional protection. The system consists of an air handling unit which draws air from the outside through a damper, medium efficiency filters, an electric heating coil, a chilled water cooling coil, and a fan followed by an electric reheat coil. Air is exhausted through the nonfiltered exhaust system of the Waste Processing Areas Ventilation System. The cooling coil of the air handling unit is supplied with chilled water from the Non-Essential Services Chilled Water System.

None of the HVAC equipment described above is safety related. The non-safety related subsystems will not be required to operate during accident conditions. The only safety related function associated with the WPB HVAC System is that provided by air handling unit AH-29. AH-29 consists of a safety related air recirculation fan and cooling coil unit which cools the MCC/Instrument Rack Area in Room W262. AH-29 is an ESF and will automatically start on a Safety Injection Signal.

The WPB HVAC System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The WPB HVAC System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

The WPB HVAC System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the WPB HVAC System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The WPB HVAC System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

FSAR and Drawing References

The WPB HVAC System Is described in Section 9.4.3 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the WPB HVAC System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

8-G-0533 S03-LR   8-G-0533 S05-LR   8-G-0533 S06-LR
8-G-0533 S07-LR

Components Subject to Aging Management Review

The table below identifies the WPB HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-64 Auxiliary Systems – Summary of Aging Management Evaluation – Waste Processing Building HVAC System.

TABLE 2.3.3-64 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE PROCESSING BUILDING HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Cooling Coil Housing	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
MCC & Instrument Rack Area Cooling Coil Housing	M-1 Pressure-Boundary
MCC & Instrument Rack Area Cooling Coil	M-5 Heat Transfer
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.73 Diesel Generator Building Ventilation System

System Description

The Diesel Generator Building Ventilation System is designed to provide temperature control and ventilation to the various rooms in the Diesel Generator Building. System functions include serving the Diesel Generator Building to a) maintain the temperature in the EDG Rooms whenever the EDGs are in operation and b) maintain the temperature in the Electrical Equipment and Fan Rooms for protection of electric equipment and motors. This safety related system provides redundant trains and remains functional during and after a Safe Shutdown Earthquake. This system is considered an ESF system. The following descriptions are for each EDG Unit:

1. The Diesel Generator Room Ventilation System consists of two EDG Room Exhaust Fans 1A and 1B, each provided with a gravity discharge damper. Under normal operating conditions, Fan 1A will automatically start when the EDG starts. During an emergency start condition, Fan 1A will start via the load sequencer after the EDG starts. When the EDG is running, Fan 1B will automatically start should either the outside air temperature or the EDG Room temperature exceed setpoint limits. The system incorporates a filtered once-through ventilation system which circulates air at a low velocity to avoid entraining dust within the room or drawing any material from outside. The outside air for the EDG Room passes through a filter bank in a wall plenum and moves into the EDG Room through a labyrinth. When the EDG is not in operation, the EDG Room will be ventilated by the Fuel Oil Day Tank and Exhaust Silencer Room Exhaust Fans.

2. The Electrical Equipment Room Ventilation System is designed to filter and pressurize this air space for the purpose of limiting dust accumulation. The system consists of an air handling unit with medium efficiency filters, electric heating coil, and two EDG Electrical Equipment Room Cooling Fans. Each fan is provided with a manual shut-off inlet damper and a gravity discharge damper. One fan is continuously operating, and the standby fan will automatically start in case of failure of the operating fan. System dampers are controlled based on outside air temperature, room temperature, the presence of smoke in the ventilation system, and detection of power failure.

3. The Fuel Oil Day Tank and Exhaust Silencer Room Ventilation System consists of two centrifugal exhaust fans and associated dampers. One fan is continuously operating and one is in standby. The standby fan is automatically started in case of failure of the operating fan. Air is transferred to the Silencer Room from the HVAC Equipment Room and to the Fuel Oil Tank Room from the access corridor. System damper operation is controlled based on operating condition of the EDG.

4. The Air Start System and Axial Fan Area Ventilation System contains the exhaust fans and associated dampers for the EDG Room. These fans and dampers are utilized when the EDG is in operation. Filtered air is provided from the exhaust of the Electrical Equipment Room and the EDG Room. When the EDG is not in operation, the area will be ventilated by the Fuel Oil Day Tank and Exhaust Silencer Room Exhaust Fans and associated dampers.

5. The HVAC Equipment Room Ventilation System draws air through its room by two centrifugal exhaust fans via the adjacent Silencer Room. During EDG operation, combustion air is withdrawn via the engine air intakes from this area.

System safety related components required for safe shutdown of the plant and design basis accident receive emergency power from their respective EDG. An independent Instrument Air System provides instrument and control air for the operation of the non-safety related air operated dampers at the outside air intakes of the EDG Room and Fuel Oil Day Tank Area and HVAC Equipment Room. Electric unit heaters provided for the EDG areas are not safety related since they are not required to operate during emergency conditions.

The Diesel Generator Building Ventilation System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal. The Diesel Generator Building Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Diesel Generator Building Ventilation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Maintain the temperature in the Diesel Generator rooms within limits whenever the Diesel Generators are in operation, and • Maintain the temperature in the electrical equipment room and fan room within limits.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Diesel Generator Building Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The Diesel Generator Building Ventilation System is described in HNP FSAR Section 9.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Diesel Generator Building Ventilation System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0548-LR

Components Subject to Aging Management Review

The table below identifies the Diesel Generator Building Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-65 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Building Ventilation System.

TABLE 2.3.3-65 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Cooling Coil Housing	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.74 Fuel Oil Transfer Pump House Ventilation System

System Description

The Fuel Oil Transfer Pump House Ventilation System is designed to remove combustible diesel fuel fumes and maintain room temperature in the Fuel Oil Transfer Pump Rooms. Although the system contains safety related components, it has been determined to be not required for operability of the Diesel Fuel Oil System. The system is capable of operation during normal and emergency conditions, but performs no safety related function required to support EDG operation.

The system consists of two exhaust subsystems. Each subsystem supports one of two Fuel Oil Transfer Pump Rooms. Each subsystem has two redundant full capacity exhaust fans, each provided with a gravity discharge damper to prevent reverse airflow through the inactive fan. One missile-protected outside air intake structure, and one missile-protected air discharge structure located on the roof are provided for the system. This system is considered an ESF system. The electric unit heaters are not safety related and, consequently, are not required to operate during emergency conditions.

During emergency conditions, a single failure in the system can affect only one of the two Fuel Oil Transfer Pump Rooms. Furthermore, the affected Fuel Oil Transfer Pump remains fully operable even with its respective ventilation system inoperable.

The Fuel Oil Transfer Pump House Ventilation System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the Fuel Oil Transfer Pump House Ventilation System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The Fuel Oil Transfer Pump House Ventilation System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The Fuel Oil Transfer Pump House Ventilation System is described in HNP FSAR Section 9.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Fuel Oil Transfer Pump House Ventilation System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0548-LR

Components Subject to Aging Management Review

The table below identifies the Fuel Oil Transfer Pump House Ventilation System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-66 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Oil Transfer Pump House Ventilation System.

TABLE 2.3.3-66 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL OIL TRANSFER PUMP HOUSE VENTILATION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.75 Fuel Handling Building Auxiliary Equipment

System Description

Most structures contain equipment that provides auxiliary services for the structure, such as, lighting fixtures, floor drains, sump pumps, and associated discharge piping and valves. These systems may be in scope of License Renewal because they contain components that perform one or more License Renewal intended functions. This equipment has been evaluated to identify mechanical or electrical/I&C components that support License Renewal intended functions. The applicable Fuel Handling Building (FHB) Auxiliary Equipment is discussed below.

The FHB houses: (1) facilities for storing, moving and handling both new fuel and spent fuel; (2) secondary waste equipment, such as evaporators, demineralizers, heaters, condensers and associated pumps, filters, and control panels; and (3) recycle evaporators, recycle holdup tanks, and heating, ventilating, and air conditioning ducts, and associated pumps, filters, and hydrogen purge unit. Structural elements, cranes, cubicles, panel, and racks are evaluated as structural components together with the FHB structure. Electrical and mechanical equipment, such as, heaters, lights, and circuit breakers that provide a support function for the FHB are evaluated in this subsection.

The FHB Auxiliary Equipment contains mechanical and electrical components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

Based on the above discussion, the FHB Auxiliary Equipment has the following system intended functions for License Renewal:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The FHB Auxiliary Equipment is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The FHB Auxiliary Equipment is described in Section 3.8.4.1.3 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The portion of the FHB Auxiliary Equipment within scope consists of civil commodities and non-safety related electrical component supports. These commodities are not shown on the Scoping drawings.

Components Subject to Aging Management Review

The FHB Auxiliary Equipment components and commodities requiring AMR consist of civil commodities and non-safety related electrical component supports; these are addressed as civil commodities in Section 2.4.

2.3.3.76 Fuel Handling Building HVAC System

System Description

The Fuel Handling Building (FHB) HVAC System provides heating, ventilation, and cooling to maintain the indoor design temperature range of the served areas of the FHB during plant operation; to isolate fuel handling areas in the event of any accidental release of radioactive material; and to maintain these areas at sub-atmospheric pressure by the Emergency Exhaust System in order to limit potential off-site exposures. The system also cools the Spent Fuel Pool Pump Room and other areas housing safety related equipment during normal and emergency conditions and provides detection and control of the spread of smoke in the event of a fire.

The FHB HVAC System consists of:

1. The Air Conditioning System for the Operating Floor, i.e., the Spent Fuel Pool area, provides ventilation and the proper temperature environment for personnel comfort and safety and equipment and isolation of selected areas upon occurrence of a fuel handling accident or upon any accidental release of radioactive material. The system consists of a supply subsystem and an exhaust

subsystem. The supply subsystem consists of four supply air handling units using chilled water. Each unit includes a louver with birdscreen, isolation damper, medium efficiency filters, electric heating coil, chilled water cooling coil, electric reheat coil and a fan. Cooled air is continuously supplied along two sides of the fuel pools. Air is continuously exhausted at the ceiling by the exhaust subsystem. The exhaust subsystem consists of four exhaust units with a fan and dampers. Receipt of a high radiation signal causes isolation dampers in the common ducts to close before the postulated contaminated air rising from the surface of the fuel pools reaches the ducts. Upon detection of smoke in the system, the supply fans will automatically be tripped. The system is not safety related and it is not required to operate during accident conditions.

2. The Emergency Exhaust System is a safety related ESF Filter System. The system is designed to mitigate the consequences of a postulated fuel handling accident by removing the airborne radioactivity from the FHB exhaust air prior to release to the atmosphere. The system maintains the operating floor of the FHB under negative pressure following a fuel handling accident to prevent unfiltered outleakage of airborne radioactive materials.

   The Emergency Exhaust System consists of redundant fan and filter subsystems. Each of the two subsystem filter trains includes a valve, demister, electric heating coil, medium efficiency pre-filter, HEPA pre filter, charcoal adsorber, HEPA after-filter and decay heat cooling air connection. Following a fuel handling accident, radioactivity released from fuel rods will be detected by the radiation monitors located around the fuel pools. These radiation monitors will then signal the switchover from the normal to the emergency ventilation and filtration subsystem. Negative pressure is established by continuously exhausting air from the operating floor.

3. The Normal Ventilation System for areas below the operating floor provides ventilation for areas below the operating floor, provides cooling for protection of mechanical and electrical equipment, and directs air flow from areas of low potential radioactivity to areas of progressively higher potential radioactivity. The system consists of a normal supply subsystem and a normal exhaust subsystem. Normal supply air equipment consists of supply fans, ductwork and dampers. The fan inlets are connected to a common plenum and air is drawn from outside and supplied below the operating floor through a louver, damper, medium efficiency filters and an electric heating coil. Air is continuously exhausted from the areas below the operating floor by exhaust fans, ductwork and dampers. An electric unit heater and an exhaust fan provide for temperature control in the north Heating & Ventilating Equipment Room. Upon detection of smoke in the system, the supply fans are automatically tripped to prevent its spread. The system is not safety related except for the isolation dampers located in the supply and return ducts of the loading areas. Upon the occurrence of a high radiation

signal, the isolation dampers will be closed and the operating floor and the loading area will be isolated from other areas of FHB.

4. The Spent Fuel Pool Pump Room Ventilation System provides cooling for pumps, heat exchangers, and equipment associated with the Emergency Exhaust System. The system includes two 100-percent capacity air handling units consisting of medium efficiency filters, a chilled water cooling coil and a fan. The chilled water to the cooling coil is provided by the Essential Services Chilled Water System. The air handling unit supplies cooled air to the Spent Fuel Pool Pumps and Heat Exchangers area, MCC Room, Heating & Ventilation Equipment area, and the emergency filtration area during normal and emergency conditions. In the event of loss of offsite power, the air handling units of the Spent Fuel Pool Pump Room Ventilation System will be powered by the EDGs. This system is considered an ESF ventilation system.

The FHB HVAC System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The FHB HVAC System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification and fire protection.

Based on the above discussion, the FHB HVAC System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Mitigates the consequences of the fuel handling accident by removing the airborne radioactivity from the FHB exhaust, • Maintains the site boundary dose within the guidelines of 10CFR 50.67 following a fuel handling accident, • Maintains the operating floor of the FHB under negative pressure following a fuel handling accident to prevent unfiltered leakage of airborne radioactivity, • Closes dampers upon the occurrence of a high radiation signal, and • Provides cooling for essential equipment.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ and fire protection.

The FHB HVAC System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The FHB HVAC System is described in HNP FSAR Sections 6.5.1, 9.4.2, and 9.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the FHB HVAC System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

8-G-0533-LR

Components Subject to Aging Management Review

The table below identifies the FHB HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-67 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System.

TABLE 2.3.3-67 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING BUILDING HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Bird Screens	M-2 Filtration
Closure bolting	M-1 Pressure-Boundary
Damper Housings	M-1 Pressure-Boundary
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary

TABLE 2.3.3-67 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING BUILDING HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Elastomer seals and components	M-1 Pressure-Boundary
Fan Housings	M-1 Pressure-Boundary
Filter Housings	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Fuel Handling Building Normal Supply Cooling Coil Housing	M-1 Pressure-Boundary
Fuel Handling Building Pump Room Cooling Coil	M-5 Heat Transfer
Fuel Handling Building Pump Room Cooling Coil Housing	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.77 Turbine Building Health Physics Room Auxiliary Equipment

System Description

Most structures contain equipment that provides auxiliary services for the structure, such as, lighting fixtures, floor drains, sump pumps, and associated discharge piping and valves. These systems may be in scope of License Renewal because they contain components that perform one or more License Renewal intended functions. This equipment has been evaluated to identify components that support License Renewal intended functions. The applicable Turbine Building (TB) Health Physics Room Auxiliary Equipment is discussed below.

The TB Health Physics Room contains equipment used in the support and maintenance of respirators. The mechanical equipment, such as, decontamination devices, heaters, and electrical equipment, such as, breakers, motors, meters, and modules, are evaluated as part of this system.

The TB Health Physics Room Auxiliary Equipment contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

Based on the above discussion, the TB Health Physics Room Auxiliary Equipment performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The TB Health Physics Room Auxiliary Equipment is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The TB Health Physics Room Auxiliary Equipment is not described in the HNP FSAR.

The TB Health Physics Room Auxiliary Equipment is not shown on any Scoping drawings.

Components Subject to Aging Management Review

The TB Health Physics Room Auxiliary Equipment components and commodities requiring AMR consist of non-safety related civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.3.3.78 Polar Crane Auxiliary Equipment

System Description

Most structures contain equipment that provides auxiliary services for the structure, such as, lighting fixtures, floor drains, sump pumps, and associated discharge piping and valves. These systems may be in scope of License Renewal because they contain components that perform one or more License Renewal intended functions. This equipment has been evaluated to identify components that support License Renewal intended functions. The applicable Polar Crane Auxiliary Equipment is discussed below.

The Containment Polar Crane is a circular bridge crane located in the Containment building. It is used for the movement of equipment on the Containment operating floor.

The Polar Crane Auxiliary Equipment consists of mechanical and electrical components, such as, drive mechanism, reduction gear, breakers, alarms, cables, switches, lighting, fuses, motors, rectifiers, resistors, and transformers.

The Polar Crane Auxiliary Equipment contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Polar Crane Auxiliary Equipment performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Polar Crane Auxiliary Equipment is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Polar Crane is described in HNP FSAR Section 9.1.4.3.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Polar Crane Auxiliary Equipment is not shown on the Scoping drawings.

Components Subject to Aging Management Review

Mechanical components associated with the Polar Crane are subcomponents of the crane. Cranes are evaluated as civil structures for License Renewal. The electrical components of the Polar Crane are non-safety related motors. Therefore, the Polar Crane Auxiliary Equipment components and commodities requiring AMR are non-safety related civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.3.3.79 Elevator System

System Description

The Elevator System consists of the following elevators:

1. Containment Building elevator,
2. Fuel Handling Building elevator,
3. K Building elevator located in the Outside Power Block structure,
4. Reactor Auxiliary Building elevator,
5. Turbine Building elevator,
6. Waste Processing Building elevator #1, and
7. Waste Processing Building elevator #2.

Elevators are provided outside the containment to serve as escape routes and may be used as access routes for fire fighting. These elevators are located throughout the plant along with the associated electrical switches and circuit breakers and supporting enclosures. The structural components of the Elevator System are evaluated as civil commodities as part of building where they are located. The remaining mechanical and electrical components, such as, AC circuit breakers, motors, gearboxes, and disconnect switches, are evaluated as part of this system.

The Elevator System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

Based on the above discussion, the Elevator System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Elevator System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

<u>FSAR and Drawing References</u>

The Elevator System is not described in the HNP FSAR.

The Elevator System is not shown on any Scoping drawings.

<u>Components Subject to Aging Management Review</u>

The Elevator System components and commodities requiring AMR consist of non-safety related civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.3.3.80 Technical Support Center HVAC System

System Description

The Technical Support Center (TSC) is located in the FHB. The TSC is provided with radiological protection and monitoring equipment to protect personnel. This consists of monitoring equipment capable of continuous indication of dose rates and airborne radioactivity concentrations.

TSC support components consist of mechanical and electrical components, such as, lighting, switches, breakers, alarms, motors, controllers, transmitters, sensors, air handling units, dampers, fans, ductwork, filters, and heat pumps. These components are evaluated as part of the TSC HVAC System.

The TSC HVAC System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The TSC HVAC System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection.

Based on the above discussion, the TSC HVAC System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection.

The TSC HVAC System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. Components that are relied on during postulated fires.

FSAR and Drawing References

The TSC HVAC System is not described in HNP FSAR.

The TSC HVAC System is not shown on any Scoping drawings.

Components Subject to Aging Management Review

The table below identifies the TSC HVAC System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-68 Auxiliary Systems – Summary of Aging Management Evaluation – Technical Support Center HVAC System.

TABLE 2.3.3-68 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TECHNICAL SUPPORT CENTER HVAC SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Ducting and components	M-1 Pressure-Boundary
Ducting closure bolting	M-1 Pressure-Boundary

2.3.3.81 Mechanical Components in Electrical Systems

The 230KV Switchyard System and the Gross Failed Fuel Detection System have been assigned to the Electrical and I&C area; however, they contain mechanical components that support system intended functions. These mechanical components have been screened with the Auxiliary Systems and are discussed below.

230KV Switchyard System

The purpose of the 230KV Switchyard System is to connect the power generated by HNP to the CP&L system for distribution to its customers and to provide a source of dependable off-site power to the plant during startup, emergency, or controlled shutdown operations. The Startup Transformers (SUTs) within the 230KV Switchyard System are supplied power from the switchyard via underground 230KV low pressure oil-filled cable. The oil is provided to the cables through piping from tanks. The tanks, piping, and piping elements up to the connection to the cable are mechanical components that support the system intended function. Additional details of the Switchyard System design are provided in Subsection 2.1.1.3.4. The 230KV Switchyard System supplies power to the SUTs as the preferred source of offsite power when recovering form a station blackout.

Based on the above discussion, the 230KV Switchyard System has the following system intended functions for License Renewal:

10 CFR54.4(a)(3) Functions	• Support functions associated with station blackout.

The 230KV Switchyard System is in the scope of License Renewal, because it contains:

1. Components that are relied on during station blackout events.

FSAR and Drawing References

230KV Switchyard System components are described in HNP FSAR Sections 8.2 and 9.5.1.2.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the 230KV Switchyard System are not shown on any of the Scoping drawings. Refer to Figure 2.1-2.

Components Subject to Aging Management Review

The table below identifies the 230KV Switchyard System components and commodities requiring aging management review (AMR) and their intended functions. The results of the AMR for these components/commodities are provided in Table 3.3.2-69 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Components in Electrical System.

TABLE 2.3.3-69A COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: 230KV SWITCHYARD SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure Boundary
Tanks	M-1 Pressure Boundary

Gross Failed Fuel Detection System

The Gross Failed Fuel Detector System is designed to detect fuel failure by the measurement of delayed neutron activity in the reactor coolant. . The Gross Failed Fuel Detector System and the Primary Sampling System share a common sample path inside Containment. The system contains a detector, preamplifier, sample cooler, and associated flow controls located outside the Containment. The coolant sample passes through a cooler and then into a coil containing a neutron detector and moderator, after which it flows back into theVCT. The sample delay time to the neutron detector is adjusted by means of a flow controller.

The Gross Failed Fuel Detector System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Gross Failed Fuel Detector System performs the following system intended functions.

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Gross Failed Fuel Detection System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Gross Failed Fuel Detection System is described in HNP FSAR Section 9.3.6. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Gross Failed Fuel Detection System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0052-LR

Components Subject to Aging Management Review

The table below identifies the Gross Failed Fuel Detection System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-69 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Components in Electrical Systems.

TABLE 2.3.3-69B COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: GROSS FAILED FUEL DETECTION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, Piping components, and piping elements	M-1 Pressure-Boundary

2.3.3.82 Monorail Hoists Equipment

System Description

Monorail Hoists Equipment supports the various monorail hoists located throughout the plant and consists of associated electrical switches and circuit breakers and supporting enclosures. Structural components consisting of cranes, hoists and protective enclosures, are evaluated as civil components or commodities as part of building where they are located.

Monorail Hoists Equipment contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are, therefore, included within the scope of License Renewal.

Based on the above discussion, the Monorail Hoist Equipment performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Monorail Hoist Equipment is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Monorail Hoist Equipment is described in HNP FSAR Section 9.1.4.2.2.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Monorail Hoist Equipment is not shown on any Scoping drawings.

Components Subject to Aging Management Review

The Monorail Hoist Equipment components and commodities requiring AMR consist of non-safety related civil components and supports for non-safety related electrical components. These are addressed as civil commodities in Section 2.4.

2.3.3.83 Post-Accident Hydrogen System

System Description

The systems required to monitor and control combustible gases in Containment are identified as the Post-Accident Hydrogen System, which consists of the hydrogen recombiners and hydrogen monitoring components. The hydrogen purge function is considered as a backup for the recombiners and is not relied upon for safety. The hydrogen purge function is discussed further in Subsection 2.3.3.65, Containment Atmosphere Purge Exhaust System. Mixing of hydrogen inside containment is accomplished by the Containment Cooling System; refer to Subsection 2.3.3.63.

The two recombiner units are located in the Containment such that they process a flow of containment gases containing hydrogen at a concentration which is generally typical of the average concentration throughout Containment. Containment atmosphere is circulated through the recombiner by natural circulation, where the hydrogen bearing gases are heated to a temperature sufficient to cause recombination with the oxygen in the Containment atmosphere. The hydrogen recombiner consists of a thermally insulated vertical metal duct with metal-sheathed electric resistance heaters provided to heat a continuous flow of containment air containing hydrogen up to a temperature sufficient to cause a reaction between hydrogen and oxygen.

The Post-Accident Hydrogen System includes the Post-Accident Hydrogen Monitoring System which consists of containment sampling valve manifolds, containment isolation valves, Hydrogen Analyzers located in the RAB, remote control panel, sample dilution panel, and sample return line. The hydrogen monitor system will be placed in service following a LOCA. When placed in service, the system provides continuous indication and recording of containment hydrogen concentration. Samples may be taken from six Containment locations to monitor hydrogen concentration or provide a sample for laboratory analysis. Lines between the hydrogen analyzer cabinet and sample points up to and including the isolation valves are designed to ASME Section III, Safety Class 2, Seismic Category I requirements.

The hydrogen analyzers consist of two identical units which are completely independent of each other and are powered from independent onsite sources. The sample points are located on various elevations providing a broad coverage of the Containment for monitoring of hydrogen concentration in a post-LOCA condition. The containment atmosphere is monitored after a LOCA in order to maintain hydrogen control. Before a hazardous concentration of hydrogen is being approached, procedures require that the control room operator initiate operation of a hydrogen recombiner. One of the two redundant recombiners is required to operate in order for the system to perform its safety function.

The Post-Accident Hydrogen System ensures that hydrogen gas generated inside the Containment following a LOCA does not exceed the RG 1.7 limit of 4 percent by volume.

The Post-Accident Hydrogen System has a RG 1.97, Category 1, requirement to monitor post-accident hydrogen concentration in containment.

The Post-Accident Hydrogen System includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1, requirement.

The Post-Accident Hydrogen System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

The Post-Accident Hydrogen System meets the scoping criteria for EQ.

Based on the above discussion, the Post-Accident Hydrogen System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Controls the buildup of hydrogen gas inside Containment following an accident. • Contains components that support the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ.

The Post-Accident Hydrogen System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Post-Accident Hydrogen System is described in Section 6.2.5 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Post-Accident Hydrogen System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0105-LR

Components Subject to Aging Management Review

The table below identifies the Post-Accident Hydrogen System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.3.2-70 Engineered Safety Features - Summary of Aging Management Evaluation – Post-Accident Hydrogen System.

TABLE 2.3.3-70 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: POST-ACCIDENT HYDROGEN SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Hydrogen Analyzer Tubing and Valves	M-1 Pressure-Boundary
Hydrogen Recombiners	M-1 Pressure-Boundary
Remote Sample Dilution Panel Pump	M-1 Pressure-Boundary
Remote Sample Dilution Panel Refrigeration Unit	M-1 Pressure-Boundary
Remote Sample Dilution Panel Sample Cooler	M-1 Pressure-Boundary
Remote Sample Dilution Panel Sample Cooler Tubes	M-1 Pressure-Boundary
Remote Sample Dilution Panel Tubing and Valves	M-1 Pressure-Boundary
Closure Bolting	M-1 Pressure-Boundary
Containment Isolation Piping and Components	M-1 Pressure-Boundary
Piping Insulation	M-6 Thermal Insulation
Piping, Piping Components, and Piping Elements	M-1 Pressure-Boundary

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The Steam and Power Conversion Systems act as a heat sink to remove heat from the reactor and convert the heat generated in the reactor to the plant's electrical output. The following systems are included in this Subsection:

1. Steam Generator Blowdown System (Subsection 2.3.4.1)
2. Steam Generator Chemical Addition System (Subsection 2.3.4.2)
3. Main Steam Supply System (Subsection 2.3.4.3)
4. Steam Dump System (Subsection 2.3.4.4)
5. Auxiliary Boiler/Steam System (Subsection 2.3.4.5)
6. Feedwater System (Subsection 2.3.4.6)
7. Feedwater Heater Drains & Vents System (Subsection 2.3.4.7)
8. Auxiliary Feedwater System (Subsection 2.3.4.8)
9. Auxiliary Steam Condensate System (Subsection 2.3.4.9)
10. Condensate System (Subsection 2.3.4.10)
11. Condensate Storage System (Subsection 2.3.4.11)
12. Secondary Sampling System (Subsection 2.3.4.12)
13. Steam Generator Wet Lay Up System (Subsection 2.3.4.13)
14. Turbine System (Subsection 2.3.4.14)
15. Digital-Electric Hydraulic System (Subsection 2.3.4.15)
16. Turbine-Generator Lube Oil System (Subsection 2.3.4.16)

2.3.4.1 Steam Generator Blowdown System

System Description

The Steam Generator Blowdown System removes contaminants and corrosion product accumulations from the Steam Generators to maintain secondary water chemistry within prescribed limits.

The Steam Generator Blowdown System includes containment isolation valves, a blowdown flash tank, a blowdown drain tank, a heat exchanger, pre-filter, three demineralizers, resin traps, blowdown flow instrumentation, and associated control valves, thermowells, venturis, nozzles, and piping. However, not all of these components are in scope for License Renewal.

The Steam Generator Blowdown System constitutes a potential radioactivity release path to the environment even though two barriers exist between the fission products and the environment. The portion of the system from the Steam Generator (SG) to and including the containment isolation valves are an extension of the SG boundary. These valves and piping also constitute part of the containment boundary. The isolation valves close automatically on an Auxiliary Feedwater Actuation Signal or an SIS.

The system includes components required for containment isolation. Containment isolation valve position indication is a RG 1.97 Category 1 function.

The Steam Generator Blowdown System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Steam Generator Blowdown System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ, fire protection, and SBO.

Based on the above discussion, the Steam Generator Blowdown System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, • Supports post-accident monitoring, and • Maintains steam generator pressure boundary.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Steam Generator Blowdown System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

<u>FSAR and Drawing References</u>

The Steam Generator Blowdown System is described in HNP FSAR Section 10.4.8. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Steam Generator Blowdown System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0051-LR

<u>Components Subject to Aging Management Review</u>

The table below identifies the Steam Generator Blowdown System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Steam Generator Blowdown System.

TABLE 2.3.4-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM GENERATOR BLOWDOWN SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.2 Steam Generator Chemical Addition System

System Description

The Steam Generator Chemical Addition System supplies various chemical additives to the Steam and Power Conversion Systems. The addition of these chemicals serves to control oxygen concentration and maintain proper pH limits in order to minimize corrosion. Chemical feed to secondary water is based on all volatile treatment which involves injection of an amine and hydrazine or equivalent solutions to the effluent header of the condensate polishing demineralizer. An amine solution is added for establishing and maintaining alkaline pH conditions throughout the secondary cycle. Hydrazine or equivalent solution is added for scavenging dissolved oxygen present in the cycle and maintaining adequate residual concentration to ensure that a minimal amount of dissolved oxygen enters the SG. The use of the all volatile treatment method reduces general corrosion and thereby minimizes the transport of corrosion products to the SG.

The Steam Generator Chemical Addition System contains tanks, heaters, mixers, metering pumps, valves, piping (safety related) and level alarms necessary for chemical delivery. Not all of these components are in scope for License Renewal. The system contains piping segments that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their historical quality class designation.

The Steam Generator Chemical Addition System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review.

Based on the above discussion, the Steam Generator Chemical Addition System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Steam Generator Chemical Addition System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Steam Generator Chemical Addition System is described in HNP FSAR Section 10.3.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Steam Generator Chemical Addition System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0053-LR

Components Subject to Aging Management Review

The table below identifies the Steam Generator Chemical Addition System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-2 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Chemical Addition System.

TABLE 2.3.4-2 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM GENERATOR CHEMICAL ADDITION SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.3 Main Steam Supply System

System Description

The Main Steam Supply System is designed to perform the following functions:

1. Deliver steam from the secondary side of the SGs to the Turbine Generator stop valves at the required steam conditions,
2. Dissipate heat generated by the reactor when the Turbine Generator is not in service by use of the Steam Dump System,
3. Provide steam for turbine gland seals, reheaters, and other plant auxiliary components,
4. Dissipate heat to atmosphere when the Main Condenser is not available through the Main Steam Safety or Main Steam PORVs,
5. Isolate the SGs from the remainder of the Main Steam Supply System and from each other as discussed in the plant accident analysis,
6. Provide adequate overpressure protection for the SGs and Main Steam Supply System, and
7. Supply steam to the Auxiliary Feedwater Pump Turbine.

Steam flow from each SG is measured across a flow limiter which is provided in the SG steam outlet nozzle to restrict the steam flow from the affected SG in the event of a MSLB.

Each steam line from a SG is provided with five Main Steam Safety Valves, one electro-hydraulic PORV and one Main Steam Isolation Valve (MSIV). The steam supply to the Auxiliary Feedwater Pump turbine drive is taken from two of the three steam supply pipes upstream of the MSIVs. The Main Steam Supply System also supplies steam to the Moisture Separator Reheaters. The PORVs are automatically controlled by main steam pressure. The valves are designed to fail closed on loss of power and are connected to safety buses for maximum reliability.

The system includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1 function. The system also contains RG 1.97, Category 1 steam line pressure transmitters.

The Main Steam Supply System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Main Steam Supply System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ, SBO, and fire protection.

Based on the above discussion, the Main Steam Supply System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Dissipate heat from the reactor when the Turbine Generator is not in service, • Dissipate heat to atmosphere when the Main Condenser is not available through the Main Steam Safety Valves or the Power-Operated Relief Valves, • Isolate the Steam Generators from the remainder of the Main Steam Supply System and from each other as discussed in the plant accident analysis, • Support the containment isolation function, • Supply steam to the Auxiliary Feedwater Pump Turbine, • Provide overpressure protection for the Steam Generators and Main Steam Supply System, and • Support post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with ATWS, fire protection, EQ, and SBO.

The Main Steam Supply System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

<u>FSAR and Drawing References</u>

The Main Steam Supply System is described in HNP FSAR Sections 7.4.1.7 and 10.3. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Main Steam Supply System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0042-LR

Components Subject to Aging Management Review

The table below identifies the Main Steam Supply System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-3 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Steam Supply System.

TABLE 2.3.4-3 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN STEAM SUPPLY SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping Insulation	M-6 Thermal Insulation
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.4 Steam Dump System

System Description

The Steam Dump System reduces the magnitude of transients on the NSSS following large load reductions.

The system performs the following functions:

1. Permits the plant to accept sudden load rejections,
2. Removes stored energy and residual heat from the primary system following a Turbine trip or Reactor trip,
3. Maintains the plant in hot standby condition, and
4. Permits manual controlled cooldown of the plant to the point where the Residual Heat Removal System can be placed in service.

The Steam Dump System is able to accommodate an abnormal load rejection and to reduce the effects of the transient imposed upon the RCS. By bypassing Main Steam directly to the condenser and/or the atmosphere, an artificial load is maintained on the RCS. The RCS can then reduce the reactor temperature to a new equilibrium value without causing overtemperature and/or overpressure conditions.

The system consists of eight Atmospheric Steam Dump Valves, which dump steam directly to atmosphere, and six Condenser Steam Dump Valves, which allow steam to bypass the turbine and dump to the Condenser. Steam dump valves are connected to the Main Steam piping downstream of the MSIVs. Isolation of the Steam Dump Valves is permissible as the Steam Dump System is not essential to the safe operation of the plant. The Steam Dump System has no safety related function, is not essential to safe operation of the plant, and is designed to non-nuclear safety standards. However, the system contains control switches that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their historical quality class designation. In addition, failure of the Steam Dump System high energy lines has no detrimental effect on safety related systems.

The Steam Dump System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Steam Dump System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Steam Dump System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Steam Dump System is described in HNP FSAR Section 10.4.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Steam Dump System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0042-LR

Components Subject to Aging Management Review

The table below identifies the Steam Dump System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-4 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Dump System.

TABLE 2.3.4-4 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM DUMP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.5 Auxiliary Boiler/Steam System

System Description

The Auxiliary Boiler/Steam System supplies saturated steam for non-safety related use in various balance of plant and reactor support systems. It is mainly utilized during plant start-ups, shutdowns, and during refueling outages. The system includes Auxiliary Boiler B, located in the Yard. Auxiliary Boiler B is normally maintained in a shutdown condition and must be manually started by an operator. Once it is on-line, the Auxiliary Boiler operates automatically. The Auxiliary Boiler/Steam System is not a safety related system and is not required to operate during or following design basis accidents. However, it can be the sole source of steam supply to the plant during certain conditions, and its reliability can be important to certain plant recovery operations. The Auxiliary Steam Supply System is normally supplied by the Main Steam Supply or the Extraction Steam System. When these systems are unavailable, it is supplied by the

Auxiliary Boiler. The Auxiliary Condensate System is designed to receive the condensed steam from the process equipment supplied with Auxiliary Steam. The Auxiliary Boiler Fuel Oil System is designed to receive and store fuel for the Auxiliary Boiler.

System mechanical components include a boiler, chemical tanks, chemical feed pumps, piping, valves, and steam traps. Other components include instrumentation, breakers, transmitters and controllers required to operate the system. Two excess flow check valves located in the TB provide isolation of steam to the RAB in the event of a piping failure in the RAB.

The Auxiliary Boiler/Steam System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Auxiliary Boiler/Steam System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Auxiliary Boiler/Steam System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

<u>FSAR and Drawing References</u>

The Auxiliary Boiler/Steam System is described in HNP FSAR Section 10.3.1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Auxiliary Boiler/Steam System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0189-LR

Components Subject to Aging Management Review

The table below identifies the Auxiliary Boiler/Steam System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-5 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Boiler/Steam System.

TABLE 2.3.4-5 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY BOILER/STEAM SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.6 Feedwater System

System Description

The Feedwater System provides feedwater at the proper flow rate, temperature, and pressure to the SGs as required by the NSSS to generate steam during normal plant operating conditions.

Two 50-percent capacity motor-driven Steam Generator Feedwater Pumps take suction from the Condensate System and discharge through two 50-percent single stage high pressure feedwater heaters to feedwater flow control valves. The feedwater flow to the three SGs is controlled automatically by three feedwater regulating valves. Feedwater regulating bypass valves, which allow automatic control of feedwater flow at low power levels, are provided in parallel with the feedwater regulating valves. Check valves are installed in each feedwater line to a SG to prevent more than one SG blowing down following a postulated feedwater line break. After the feedwater flows through the check valves, it flows through Main Feedwater Isolation Valves (MFIVs) to the SGs. The system includes components required for Containment Isolation. Containment isolation valve position indication is a RG 1.97, Category 1 function.

The principal components of the Feedwater System are the feedwater pumps, two high pressure feedwater heaters, feedwater regulating valves, feedwater regulating bypass valves, MFIVs and the associated piping, valves, and electrical components required to support the system. Each MFIV is equipped with a pneumatic actuator using an accumulator with a stored source of nitrogen to provide the motive force for operation of the valves. The MFIVs are containment isolation valves. A Main Feedwater Isolation

Signal (MFIS) will close MFIVs and trip the feedwater pumps. The feedwater regulating and regulating bypass valves will close in response to a MFIS, upon loss of power signal from the Reactor Protection System, or upon loss of control air or loss of DC power to the solenoid valves.

The system serves no safety function, with the exception of containment isolation integrity, and is therefore generally classified as non-safety related. The portion of the system classified as safety related is the portion from the feedwater header check valves to the Steam Generators.

The Feedwater System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Feedwater System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ, fire protection, and SBO.

Based on the above discussion, the Feedwater System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Supports the containment isolation function, and • Supports post-accident monitoring.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ, fire protection, and SBO.

The Feedwater System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Feedwater System is described in HNP FSAR Section 10.4.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Feedwater System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0044-LR	5-G-0044 S02-LR

Components Subject to Aging Management Review

The table below identifies the Feedwater System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-6 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Feedwater System.

TABLE 2.3.4-6 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Main Feedwater Isolation Valve Accumulators	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.7 Feedwater Heater Drains & Vents System

System Description

Feedwater Heaters improve overall plant efficiency by preheating condensate and feedwater as it is pumped from the Condenser hotwell to the SGs. The Feedwater Heater Drains & Vents System functions to:

1. Maintain a proper water level in the feedwater heaters and drain tanks of the Moisture Separator Reheaters (MSRs),
2. Provide an alternate drain path directly to the main condenser from each feedwater heater and drain tanks associated with the MSRs,

3. Improve steam cycle thermal efficiency by either cascading feedwater heater drains to the next lower heater or, in the case of Feedwater Heater 4, by pumping drains forward into the feedwater pump suction,
4. Remove non-condensable gases during start-up and normal operation from each feedwater heater and MSR,
5. Provide operational and start-up venting of the feedwater heaters and MSRs, and
6. Provide draining of feedwater heater shells and MSRs during start-up and shutdown.

The system equipment includes two heater drain pumps, level control instrumentation, MSR Drain Tanks, piping, valves, breakers, controllers and transmitters.

The Feedwater Heater Drains & Vents System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal. These components are non-safety related civil and electrical components.

Based on the above discussion, the Feedwater Heater Drains & Vents System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Feedwater Heater Drains & Vents System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Feedwater Heater Drains & Vents System is described in Section 10.4.7 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Feedwater Heater Drains & Vents System components in scope are non-safety related civil and electrical components assumed to meet the criteria of 10 CFR 54.4(a)(2). There are no mechanical components in scope; therefore, there are no Scoping drawings for this system.

Components Subject to Aging Management Review

The Feedwater Heater Drains & Vents System components and commodities requiring AMR are non-safety related civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.3.4.8 Auxiliary Feedwater System

System Description

The Auxiliary Feedwater (AFW) System serves as a backup system for supplying feedwater to the secondary side of the SGs at times when the normal Feedwater System is not available, thereby maintaining the heat sink capabilities of the SGs. The system provides an alternate to the Feedwater System during start-up, hot standby, and cooldown and also functions as an engineered safeguards system. In the latter function, the AFW System is directly relied upon to prevent core damage in the event of transients such as loss of normal feedwater or a secondary system pipe rupture.

The AFW System includes two motor-driven pumps and one turbine-driven pump with associated valves, piping, controls, electrical components and instrumentation. The system components are located in the RAB with the exception of a portion of the supply piping to the SGs located in the Containment Building. The turbine-driven pump turbine drive has an integral lubricating oil system that is cooled by a portion of the discharge flow from the turbine-driven pump. The system includes valves and components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1 function. The system also contains RG 1.97, Category 1 AFW flow transmitters.

The motor-driven and turbine-driven AFW Pumps normally take suction from the Condensate Storage Tank (CST) via a common supply line. The CST is sized to maintain a minimum inventory for the AFW System plus sufficient margin for normal Condensate System makeup and surges. The alternative to the CST, if depleted, is the ESW System, with switchover performed manually.

The motor-driven AFW Pumps discharge into a common header which supplies three independent lines, one for each SG. Each of these supply lines contain check valves, motor operated isolation valves, flow control valves, and recirculation (bypass) valves. The turbine-driven AFW Pump supplies three additional lines. Each of these supply lines also contains a check valve, motor operated isolation valve, and flow control valve. The motor-driven supply and the turbine-driven supply for each SG are joined in a common line. The common line has a flow element and is routed through the steam and feedwater Pipe Tunnel into Containment. This arrangement thus provides two 100-percent capacity redundant motor-driven pumps and one 200-percent capacity steam driven pump.

Any single failure in the AFW System will not affect the capability of the system to provide sufficient cooling water to the SGs. The common AFW supply line connects to the auxiliary feedwater nozzle on each SG. Blockage of one of these common supply lines will not affect flow in the lines to the other two SGs since these lines are independent.

The AFW System instrumentation and controls are designed for automatic operation during emergency situations such as steam line rupture, loss of normal feedwater, loss of offsite power, and manually as part of the safe shutdown systems.

The motor-driven AFW Pumps are automatically started by any one of the following signals: SIS, low-low water level in any SG, loss of power (undervoltage) on the emergency bus, loss of both Feedwater Pumps, or ATWS mitigating system actuation circuitry (AMSAC). The turbine-driven AFW Pump is automatically started by any one of the following signals: loss of power (undervoltage) on the emergency bus, low-low water level in two out of three Steam Generators, or AMSAC.

The AFW System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The AFW System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification, station blackout, fire protection, and ATWS.

Based on the above discussion, the Auxiliary Feedwater System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides feedwater flow when the normal Feedwater System is not available, thereby maintaining the heat sink capabilities of the Steam Generators, • Prevents core damage in the event of transients such as loss of normal Feedwater or a secondary system pipe rupture, • Supports the Containment isolation function, and • Provides post-accident monitoring of Containment isolation valve position and Auxiliary Feedwater flow.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, SBO and ATWS.

The Auxiliary Feedwater System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Auxiliary Feedwater System is described in HNP FSAR Section 10.4.9. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Auxiliary Feedwater System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

5-G-0042-LR 5-G-0044-LR 5-G-0045-LR
5-S-0545 S01-LR

Components Subject to Aging Management Review

The table below identifies the Auxiliary Feedwater System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-7 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Feedwater System.

TABLE 2.3.4-7 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Auxiliary Feedwater Pump Turbine	M-1 Pressure-Boundary
Auxiliary Feedwater Pump Turbine Lube Oil Cooler Components	M-1 Pressure-Boundary
Auxiliary Feedwater Pump Turbine Lube Oil Cooler Tubes	M-5 Heat Transfer

TABLE 2.3.4-7 (continued) COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY FEEDWATER SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Auxiliary Feedwater Pump Turbine Lube Oil Pump	M-1 Pressure-Boundary
Auxiliary Feedwater Pump Turbine Lube Oil Tank	M-1 Pressure-Boundary
Auxiliary Feedwater Pumps	M-1 Pressure-Boundary
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Flow restricting elements	M-1 Pressure-Boundary M-3 Throttle
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.9 Auxiliary Steam Condensate System

System Description

The Auxiliary Steam Condensate System is designed to receive the condensed steam from the process equipment supplied with Auxiliary Steam. The system consists of two condensate tanks in the WPB each having one condensate pump, and one condensate tank in the RAB having two condensate pumps. The pumps discharge to the auxiliary boiler deaerator or, if the boiler is not in operation, to the main condenser. The Auxiliary Steam Condensate Tanks are maintained at approximately atmospheric pressure, using a vent header which is connected to the main condenser.

The Demineralized Water System provides makeup water to the system. The water is mixed with condensate from the Auxiliary Steam Condensate Storage Tanks, deaerated, heated, and then pumped into the auxiliary boiler.

To avoid radioactive condensate entering the condenser, radiation monitors are installed on the discharge lines of the Auxiliary Steam Condensate Tank pumps. On detection of high radiation, the motor-operated valves installed on the line to the condenser and auxiliary boiler will automatically shut and the pumps will stop.

In order to detect the leakage of radioactivity from other systems, the Auxiliary Steam Condensate System is provided with radiation monitors. The receipt of a high radiation alarm will alert the operator to the presence of leakage so that additional radiation surveys, sampling, and equipment isolation can be effected in order to locate and repair the leakage source.

he Auxiliary Steam Condensate System performs no safety related function and has no impact on plant power production. It is not required to operate during or following design basis accidents.

The Auxiliary Steam Condensate System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Auxiliary Steam Condensate System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Auxiliary Steam Condensate System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Auxiliary Steam Condensate System is described in HNP FSAR Section 10.4.1.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Auxiliary Steam Condensate System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0242-LR

Components Subject to Aging Management Review

The table below identifies the Auxiliary Steam Condensate System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-8 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Steam Condensate System.

TABLE 2.3.4-8 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY STEAM CONDENSATE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.10 Condensate System

System Description

The function of the Condensate System is to return water from the main condenser to the Feedwater System. Condensate is pumped from the condenser hotwell by two 50-percent capacity motor-driven Condensate Pumps through the gland seal steam condenser and the full flow condensate demineralizer to the suction of two 50-percent condensate booster pumps. The Condensate System includes a bypass between the condensate demineralizer inlet and outlet headers. The condensate booster pumps discharge through two trains of four low pressure feedwater heaters to the feedwater pumps.

The condenser hotwell has a storage capacity equal to approximately five minutes of full load operation. This capacity is sufficient to allow condensate supply for the make-up of SG inventory during a full external electrical load rejection. Condensate make-up is supplied to the condenser hotwell from the CST through a level control valve. Excess condensate is discharged to the CST through a level control valve from either the discharge of the condensate pumps or the discharge of the condensate booster pumps. Condensate pumps, condensate booster pumps and main feedwater pumps are protected against flashing at the pump suction by means of electrical interlocks which trip the respective pumps on low suction pressure.

System equipment includes condensate pumps, condensate booster pumps, level and flow instrumentation, piping, valves, breakers, transmitters, and controllers. The system is not safety related.

The Condensate System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the Condensate System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The Condensate System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Condensate System is described in HNP FSAR Section 10.4.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Condensate System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0045-LR

Components Subject to Aging Management Review

The table below identifies the Condensate System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-9 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate System.

TABLE 2.3.4-9 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONDENSATE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.11 Condensate Storage System

System Description

The Condensate Storage System supplies condensate to the condenser hotwell from the CST through a level control valve. Excess condensate is discharged to the CST through a level control valve from either the discharge of the condensate pumps or the discharge of the condensate booster pumps. The CST is designed to:

1. Provide makeup and surge capacity for secondary system inventory changes due to various plant conditions,
2. Provide sufficient water storage for reactor shutdown decay heat removal by the AFW System, and
3. Provide flush water for radwaste treatment equipment.

During initial fill of the Condensate System, the condensate transfer pump discharges into the condenser hotwell. During normal plant operation, condensate flows by gravity and differential pressure from the CST to the condenser hotwell. The water level in the hotwell is maintained automatically by two level control valves. To ensure that the minimum CST inventory required for the operation of the AFW System is preserved, all non-seismic piping connections are located above the minimum water level required for AFW supply.

Water is added to the tank by using a control valve in the CST makeup line. Safety related CST water level indicators and alarms are provided in the Control Room. An empty alarm is provided to alert the operator that the CST water inventory is nearing depletion and allows sufficient time to align the AFW System to the alternate water supply, i.e., the ESW System. CST level transmitters are RG 1.97, Category 1 components.

The Condensate Storage System consists of one 100-percent capacity condensate transfer pump, one safety related, stainless steel CST, piping, valves, and instrumentation. The CST below the elevation of the Condensate Transfer Pump suction nozzle and the supply piping between the tank and the AFW Pumps are classified Safety Class 3 and Seismic Category I. A concrete enclosure protects the tank from tornado, hurricane, and missile damage. This enclosure also provides protection from postulated pipe breaks. The HNP licensing basis dictates that in the event of a loss of offsite power, sufficient CST useable inventory must be available to bring the plant from full power to hot standby conditions, maintain the plant at hot standby conditions for 6 hours, and then cool the reactor coolant system to 325°F in six hours.

The Condensate Storage System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Condensate Storage System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for EQ, fire protection, and SBO.

Based on the above discussion, the Condensate Storage System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Provides sufficient water inventory to the Auxiliary Feedwater System to support reactor shutdown and cooldown requirements, and • Supports post-accident monitoring (CST level).
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with fire protection, EQ, and SBO.

The Condensate Storage System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. Components that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

<u>FSAR and Drawing References</u>

The Condensate Storage System is described in HNP FSAR Sections 9.2.6 and 10.4.7. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Condensate Storage System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0045-LR

Components Subject to Aging Management Review

The table below identifies the Condensate Storage System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-10 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate Storage System.

TABLE 2.3.4-10 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONDENSATE STORAGE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Condensate Storage Tank	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.12 Secondary Sampling System

System Description

The Secondary Sampling System provides a means for continuous monitoring of liquid and steam purity in the steam cycle systems, including Condensate, Heater Drains and Vents, Feedwater, Steam Generator Blowdown, and Main Steam Systems, and the CST. The Secondary Sampling System conditions the sample temperature and pressure to allow proper sample parameter analysis, maintains the sample flow at proper velocity, alarms when required, provides a continuous readout and record of selected parameters, and provides grab sampling capability.

Samples from each SG are provided to the Secondary Sampling System. The SGs are automatically monitored on a continuous basis for chemistry control. Grab samples for each SG can be drawn as required at the Secondary Sampling System and may be transferred to the Hot Lab in the WPB. The Secondary Sampling System enclosure is located in the TB; however, the CST Sample Panel is located in the Tank Area/Building. The system includes valves and components required for containment isolation. Containment isolation valve position indication is a RG 1.97, Category 1 function.

The Secondary Sampling System is designed to continuously analyze most sample points for specific chemical parameters and record the results for trending purposes. This provides a central location to obtain samples from the secondary cycle during startup, power operation, and plant shutdown operations for chemical and radiochemical analyses. Chemical analyses are performed to provide a basis for proper secondary chemistry control, to eliminate loss of turbine capacity, to detect Steam Generator, Feedwater Heater, and Condenser tube failures, and to reduce corrosion problems.

The Secondary Sampling System is not essential for safe plant shutdown. The system serves no safety function, since it is not required to achieve safe shutdown or mitigate the consequences of an accident.

The Secondary Sampling System contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

The Secondary Sampling System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for environmental qualification.

Based on the above discussion, the Secondary Sampling System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that support the containment isolation function, and • Supports post-accident monitoring (containment isolation valve position).
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with EQ.

The Secondary Sampling System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Secondary Sampling System is described in HNP FSAR Section 9.3.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Secondary Sampling System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0051-LR

Components Subject to Aging Management Review

The table below identifies the Secondary Sampling System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-11 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Secondary Sampling System.

TABLE 2.3.4-11 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECONDARY SAMPLING SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Containment isolation piping and components	M-1 Pressure-Boundary
Heat exchanger shell side components	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.13 Steam Generator Wet Lay Up System

System Description

The Steam Generator (SG) Wet Lay Up System is used only to maintain chemistry conditions during wet lay up of the SGs. This will reduce SG corrosion during inactive periods. The system is a non-safety system; however, several instrument valves associated with level transmitters have a safety related quality classification.

The SG Wet Lay Up System consists of three centrifugal pumps located in the RAB, associated piping and valves, a wet lay up grab sample panel, and a local control panel. System crossties to the Feedwater, AFW, and SG Blowdown Systems allow the SG Wet Lay Up System to circulate water through the SG. The SG Chemical Addition

System is used in conjunction with the SG Wet Lay Up System to maintain wet lay up chemistry. Since the SG Wet Lay Up System is used only during shutdown conditions and its use involves several unusual system connections, piping spool pieces are employed for connecting to other systems and to assure positive isolation before normal operation of the SGs commences.

The SG Wet Lay Up System includes instrument valves that are classified as safety related. In addition, it contains non-safety related components that have the potential to cause an adverse physical interaction with safety related equipment and/or non-safety related piping components connected to and providing support for the safety related functional boundary of the system. These components have been included in scope of License Renewal as a result of the 10 CFR 54.4(a)(2) review. Also, the system contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class and are, therefore, included in scope of License Renewal.

Based on the above discussion, the SG Wet Lay Up System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.

The SG Wet Lay Up System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events, and

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

<u>FSAR and Drawing References</u>

The SG Wet Lay Up System is not described in HNP FSAR.

The License Renewal scoping boundaries for the SG Wet Lay Up System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-G-0089-LR

Components Subject to Aging Management Review

The table below identifies the SG Wet Lay Up System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-12 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Wet Lay Up System.

TABLE 2.3.4-12 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: STEAM GENERATOR WET LAY UP SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Closure bolting	M-1 Pressure-Boundary
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.14 Turbine System

System Description

The Turbine System includes the tandem compound, four flow exhaust, 1800 rpm turbine unit. The steam produced in the SGs is first passed through the high pressure turbine. The high pressure turbine element is a double flow design, where steam from the four governor valves enters the turbine through four inlet pipes. These pipes feed four double-flow nozzle chambers. Steam passes through the single control stage and flows through reaction blading where it is expanded and is then exhausted to the moisture separator reheaters located alongside the low pressure turbines on the TB operating floor. The MSRs remove the moisture content and superheat the steam before it enters the low pressure turbines. Heating steam for reheating is taken from the Main Steam System header. From the low pressure turbines the steam is exhausted to the main condenser.

The high pressure turbine has four throttle valves and four governor valves. One governor valve is located in each of the four steam inlet lines. The throttle valves are arranged in pairs and are located at the ends of two steam chest assemblies, where each communicates with either one of a pair of governor valves, also located in each steam chest assembly. The low pressure turbines have one reheat throttle valve and one reheat interceptor valve arranged in series in each of the four hot reheat lines. Therefore, each steam supply line to the high pressure and low pressure turbines is arranged such that a failure of one valve to close will not prevent the shutdown of the turbine. The turbine throttle, governor, reheat, and interceptor valves protect the turbine from exceeding set speeds and protect the Reactor System from abnormal surges.

Main turbine overspeed protection is provided with redundant mechanical and electrical trip mechanisms. The electrical trip mechanism acts as a backup to the mechanical overspeed trip mechanism. This redundancy provides adequate protection against turbine overspeed. Whenever the turbine generator trips at an operating power level above 10 percent power, the reactor also trips.

In addition to the system components described above, the Turbine System includes turbine bearings, rupture diaphragms, covers, glands, turning gear, electrical components and supervisory instrumentation. The system contains pressure instrumentation valves with a safety related quality classification that are associated with steam supply to the AFW pump turbine.

The Turbine System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for ATWS.

The Turbine System is included in the scope of License Renewal for 10 CFR 54.4 (a)(2) since failure, although highly unlikely, of the low pressure turbines, turbine throttle, governor, reheat and Interceptor Valves may prevent satisfactory accomplishment of a safety related function.

Based on the above discussion, the Turbine System has the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that have the potential for spatial interactions with safety related SSCs or are relied on for seismic continuity.
10 CFR54.4(a)(3) Functions	• Support functions associated with ATWS.

The Turbine System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated anticipated transient without scram events.

FSAR and Drawing References

The Turbine System is described in Section 10.2 and shown on Figure 10.1.0-2 of the HNP FSAR. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the Turbine System are shown on the following scoping drawings. (Scoping drawings have been submitted separately for information only.)

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Components Subject to Aging Management Review

The table below identifies the Turbine System components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.4.2-13 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Turbine System.

TABLE 2.3.3-13 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE SYSTEM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Piping, piping components, and piping elements	M-1 Pressure-Boundary

2.3.4.15 Digital-Electric Hydraulic System

System Description

The Digital-Electric Hydraulic (DEH) System positions the turbine steam inlet valves in order to regulate the flow of steam through the turbine. The DEH System is divided into three subsystems, the fluid subsystem, the emergency trip subsystem, and a control subsystem. The function of the DEH fluid supply subsystem is to provide high pressure fluid, and thereby a motive force to the turbine steam inlet valve actuators. The actuators position 16 turbine steam valves in response to electric commands from the DEH electronic controller. The fluid system consists of a reservoir assembly with controls, pumps, motors, filters, and heat exchangers. The DEH control fluid is triarylphosphate ester selected for its fire resistance and fluid stability qualities.

The turbine emergency trip subsystem interfaces with the DEH System to monitor critical turbine parameters, and trip the turbine valves closed when these parameters are exceeded. The emergency trip subsystem consists of an emergency trip and test controls, a trip cabinet, an emergency trip panel, and sensing devices including an overspeed pickup. Various sensing devices provide a signal to the trip cabinet where relay and electronic logic determine if a trip should occur. Circuits used for turbine trip have a safety related quality classification.

The main function of the DEH control subsystem is to position the Turbine inlet valves to control Turbine speed or output. The system contains valves, filters, heat exchangers, valve operators, pumps, strainer, reservoir, power supplies, motors and switches.

The DEH System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal.

The DEH System includes components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for ATWS.

Based on the above discussion, the DEH System performs the following system intended functions:

10 CFR54.4(a)(1) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(1) based on their quality class designation.
10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.
10 CFR54.4(a)(3) Functions	• Support functions associated with ATWS.

The DEH System is in the scope of License Renewal, because it contains:

1. Components that are safety related and are relied upon to remain functional during and following design basis events,

2. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. Components that are relied on during postulated anticipated transient without scram events.

FSAR and Drawing References

The DEH System is described in HNP FSAR Section 10.2.2.4. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The License Renewal scoping boundaries for the DEH System are shown on the following scoping drawing. (Scoping drawings have been submitted separately for information only.)

5-S-0553 S02-LR

Components Subject to Aging Management Review

The components that are in scope for License Renewal consist of mechanical and electrical components that supply pressurized oil to the turbine controls. Failure of the pressure boundary of the mechanical components would not prevent the function of turbine trip, because the function is intiated by loss of oil pressure. The remaining components were screened as not requiring an aging management review because they perform an active function.

2.3.4.16 Turbine-Generator Lube Oil System

System Description

The Turbine-Generator Lube Oil System supplies the clean oil lubrication for the turbine, generator, and turning gear bearings and provides seal backup oil to the Seal Oil System. It also interfaces with the Digital-Electric Hydraulic System high pressure emergency trip header. The Turbine-Generator Lube Oil System includes a main oil pump, seal oil pump, normal bearing oil pump, emergency bearing oil pump, vapor extractors, a lube oil reservoir, and a lube oil conditioner. The system also contains piping, filters, valves, electrical components, and instrumentation.

The main oil pump is shaft-driven by the turbine; with the unit on-line, this pump provides all required lubricating oil. The lube oil conditioner removes free water, particulate matter, and other contaminants from the lubrication oil. Lube oil exits an ejector where part of the flow goes back to the main oil pump suction; and the remainder goes through a lube oil cooler, which uses service water for cooling.

The Turbine-Generator Lube Oil System contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation and are therefore included within the scope of License Renewal. These components are electrical components; there are no mechanical components that meet the scoping requirements for License Renewal.

Based on the above discussion, the Turbine-Generator Lube Oil System performs the following system intended functions:

10 CFR54.4(a)(2) Functions	• Contains components that are conservatively assumed to meet the criteria of 10 CFR 54.4(a)(2) based on their quality class designation.

The Turbine-Generator Lube Oil System is in the scope of License Renewal, because it contains:

1. Components which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Turbine-Generator Lube Oil System is described in HNP FSAR Section 10.2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

The Turbine-Generator Lube Oil System components that are in scope for License Renewal are civil and electrical components. Therefore, no Scoping drawings are provided.

Components Subject to Aging Management Review

The Turbine-Generator Lube Oil System components that are subject to AMR consist of non-safety related civil commodities and supports for non-safety related electrical components; these are addressed as civil commodities in Section 2.4.

2.4 SCOPING AND SCREENING RESULTS – STRUCTURES

The determination of structures within the scope of License Renewal is made by initially identifying HNP structures and then reviewing them to determine which ones satisfy one or more of the criteria contained in 10 CFR 54.4. A description of this process is provided in Section 2.1, and the results of the structures scoping review are contained in Section 2.2.

Section 2.1 also provides the methodology for determining the structures and components (SCs) within the scope of 10 CFR 54.4 that meet the requirements contained in 10 CFR 54.21(a)(1). The SCs that meet these screening requirements are identified in this section. These SCs require an aging management review for License Renewal.

Screening results are provided below in two Subsections: (1) Containment Building, and (2) Other Class 1 and In-Scope Structures.

2.4.1 CONTAINMENT BUILDING

The Containment Building consists of the pressure retaining Containment Structure and the Containment Internal Structures that provide support for systems and equipment.

2.4.1.1 Containment Structure

Description

The HNP Unit 1 Containment Structure consists of a steel-lined, reinforced concrete structure in the form of a vertical right cylinder with a hemispherical dome and a flat base with a recess beneath the reactor vessel. The structure is not post-tensioned. The 4.5 ft. thick cylindrical wall measures 160 ft. in height from the liner on the base to the spring line of the dome and has an inside diameter of 130 ft. The inside radius of the 2 ft. 6 in. thick dome is equal to that of the cylinder so that the discontinuity at the spring line due to the change in thickness is on the outer surface. The base mat consists of a 12 ft. thick structural concrete slab. The base mat is supported by sound rock. The design of the Containment Structure is shown on FSAR Figure 3.8.1-1.

The internal surface of the Containment Structure is covered by carbon steel liner plate. The liner plate is designed as an integral part of the containment pressure-retaining barrier to retain and control the release of radioactive effluents released from the nuclear power plant equipment which the containment encloses.

The containment wall is independent of adjacent interior and exterior structures; sufficient space is provided between the containment wall and adjacent structures to prevent contact under any combination of loading. The interior grating platforms and concrete slabs are supported on steel beams which span the space between the secondary shield wall and the containment wall. These beams are independently supported, near the containment wall, by steel columns resting on the concrete mat.

The Containment supports and houses a polar crane. The circular polar crane runway girder is supported by a series of uniformly spaced steel plate brackets which extend from the inside face of the containment wall and are attached to the liner plate. The crane runway circle is not concentric with that of the Containment, but is offset to provide a passageway on one side to accommodate the pipe runs of the containment spray header piping mounted in the dome. The liner plate is locally thickened to one inch to support the crane rail brackets and is anchored to the concrete containment wall.

The Containment encloses the reactor pressure vessel, pressurizer, steam generators, reactor coolant pumps, Reactor Coolant System (RCS) piping, and portions of the Engineered Safety Features (ESF) Systems. The containment wall protects the RCS from site environmental conditions. It is designed as a seismic Category I structure for earthquake, tornado, and external missile loading conditions. It also limits the release of radioactive fission products to the environment in the unlikely event of a Loss of Coolant Accident (LOCA), and in addition, provides biological shielding for both normal and accident conditions.

The cylindrical section of the containment shell includes large openings for access hatchways and penetrations. The concrete wall is locally thickened and additional reinforcement is provided at these large penetrations. Penetrations are anchored in the containment wall.

Descriptions of the concrete, steel, and non-metallic commodities that are included in the Containment Structure are provided in the following paragraphs.

Concrete Commodities

The basemat is a conventionally reinforced concrete mat of circular shape and 12 ft. uniform thickness. The top of the mat is 44 ft. below finished grade. The entire mat is structurally independent of adjacent seismic Category I foundations. The mat has recesses in the central portion (i.e., the reactor cavity) to house the reactor pressure vessel and Containment sump, and in the ESF areas to form the ESF system sumps. The foundation mat, inside the Containment and including the reactor cavity and containment sump is covered with carbon steel liner plate. A 5 ft.-thick concrete internal mat is provided over the liner for protection and support of internal primary and secondary shield walls. The basemat is supported on a concrete working slab that is supported on a concrete seal mat. The concrete seal mat is supported on rock and is covered by a waterproofing membrane.

The cylinder wall is a reinforced concrete structure 160 ft. in height from the liner on the base to the spring line of the dome. It has an inside diameter of 130 ft. The concrete thickness of the wall is increased from 4 ft. 6 in. to 6 ft. 6 in. around the major penetrations such as the equipment hatch, personnel lock, emergency air lock, main steam penetrations, and feedwater penetrations. The cylinder wall provides support to the circular polar crane runway girder.

The containment dome is a reinforced concrete hemispherical dome of 2 ft. 6 in. uniform thickness. The dome has the same inside diameter of 130 ft. as the concrete cylinder.

Steel Commodities

The continuous welded steel liner plate functions primarily as a leak tight membrane to limit the release of radioactive materials into the environment. The nominal liner plate is 3/8 in. thick in the cylinder, 1/4 in. thick on the bottom, and 1/2 in. thick in the dome. One-in.-thick liner plate is provided near the crane girder brackets. Ring collars up to 2 in. thick are provided around penetrations and welded to the penetration sleeves. The liner is anchored to the concrete shell by means of anchor studs fusion welded to the liner plate so that it forms an integral part of the containment structure. The one inch liner plate at the crane girder brackets area is anchored into the concrete wall with shear lugs, anchor bolts connected to embedded plates, special anchorages, and Nelson studs. Refer to FSAR Figure 3.8.1-12 and Figure 3.8.1-13.

Leak chase channels or angles are provided at the liner seams for leak tightness examination. Supports for HVAC ducts, piping hangers, and ladders, are welded to the liner plate, which is locally reinforced in the region of surface attachments.

The welded attachments to the metallic liner (e.g., floor beams, seismic restraints, leak channels, equipment/pipe supports, etc.) do not perform a pressure retaining function associated with the containment vessel. For this reason, the welded attachments are not included with the liner components. These welded attachments are evaluated with the specific commodity groups. The leak chase channels are screened out of the scope of License Renewal, because they perform no License Renewal intended functions.

Containment Penetrations are addressed in FSAR Section 3.8.2. Access into the concrete Containment Structure is provided by an equipment hatch, personnel air lock, and emergency air lock. The containment penetration assemblies provide a leak tight seal for containment integrity while allowing for the passage of process, service, sampling, and instrumentation system piping through the containment wall, and for the transfer of new or spent fuel between the Containment and the Fuel-Handling Building. In addition, the electrical, mechanical and HVAC penetration seals through the Containment walls including wall openings are considered equivalent to a 3-hour fire barrier. Each of the penetrations and openings through the containment structure is conservatively considered to perform a fire barrier intended function.

The equipment hatch is a welded steel assembly having an inside diameter of 24 ft. A 15 ft. inside diameter bolted cover is provided in the equipment hatch cover for passage of smaller equipment during plant operation. FSAR Figure 3.8.1-14 shows the equipment hatch. The sub-components included in scope of License Renewal consist of the hatch assembly, weld-on cover, bolted cover, bolting, and seals. The containment equipment hatch is provided with external missile protection in the Reactor Auxiliary Building as described in FSAR Table 3.5.1-1, Item 22).

One breech-type personnel airlock, as shown on FSAR Figure 3.8.1-15, is provided. The airlock is a welded steel assembly having two doors which are double-gasketed with material resistant to radiation. Provisions are made to pressurize the space between the gaskets for leak testing. Nozzles are installed which permit pressure testing of the locks at anytime. The personnel airlock in-scope components include the barrel, doors, locks, hinges, and closure mechanisms, seals, and equalizing valves. The operating mechanisms, including handwheels, gearing, and linkages, that open and close the hatches are active commodities and are not in the scope of License Renewal.

The personnel emergency airlock is shown on FSAR Figure 3.8.1-16. It is a welded steel assembly having two doors which are double-gasketed with material resistant to radiation. The in scope sub-components include the barrel, bulkheads, doors, penetrations, equalizing valve bodies, locks, hinges, gaskets, and closure mechanism. The door operating mechanism, consisting of the handwheels, gears, cams and levers, are active components and are not in the scope of License Renewal.

Mechanical and electrical penetrations are provided in the cylindrical wall of the Containment Structure to provide access for mechanical piping and electrical cables. Refer to FSAR Section 3.8.2.1.3. Type I mechanical piping penetrations are provided for high pressure and high temperature (above 200^{o}F) lines which penetrate the concrete containment structure. The process pipe is connected to a containment penetration sleeve, which is partially embedded in the concrete wall, by a forged flued head fitting. The main steam and feedwater penetrations have a fin cooling system consisting of fin assemblies attached to the flued heads and/or penetration sleeves of Type I containment mechanical penetrations. Each fin assembly half consists of copper fins perpendicular to the axis of the penetration evenly spaced on a curved copper band. A lead blanket between the copper band and the surface of the flued head/sleeve assures good surface contact. The fin cooling assemblies provide a passive heat transfer system to remove excess heat from the penetration flued heads.

Type II mechanical piping penetrations are provided for low temperature lines which penetrate the concrete containment structure. As shown on FSAR Figure 3.8.1-18, the process pipe passes through a containment penetration sleeve which is partially embedded and anchored into the concrete wall. The annular gap between the process pipe and the sleeve is sealed on both the inside and outside faces of the concrete wall. The inside plate is designed to withstand the internal pressure and to transfer all of the normal operating loads and/or the postulated accident piping rupture loads from the piping system to the penetration sleeve and then into the concrete wall. The outside seal bellows is flexible to accommodate thermal expansion movements. Type II penetrations also include HVAC penetrations and groups of small diameter instrument and sampling lines which incorporate socket weld couplings welded to closure plates.

A special type of penetration assembly is provided on the suction lines from the containment sump. These lines are used following a LOCA for recirculation of containment sump water by the Containment Spray and Residual Heat Removal pumps. Special provisions are made on these lines to reduce the possibility of leakage of sump water during recirculation. Each line consists of a concentric pipe from the sump to a leak tight compartment enclosing a portion of the suction line and the isolation valve outside the Containment. The containment sump penetration is shown on FSAR Figure 3.8.2-1.

Several Containment penetrations have flanged penetration sleeves and utilize bolted flanged connections with blind flanges and are not used for process piping. This type of penetration is used during outages to provide for access for sludge lancing, eddy current testing cables, containment leak test equipment, and containment ventilation.

Electrical penetrations are included within the Type III penetrations. Modular type penetrations are used for all electrical conductors passing through the containment wall. Each penetration assembly consists of a stainless steel header plate attached to a carbon steel welded ring which is in turn welded to the pipe sleeve. The header plate accepts either three or six modules depending on the penetration diameter and voltage classification. Electrical conductors are hermetically sealed into the module with an epoxy compound. FSAR Figure 3.8.1-19 shows typical electrical penetrations. The penetration header plates are attached to penetration sleeves located in the wall of the containment vessel and welded to the containment liner. Sealing between the header plates and the sleeves is accomplished by welding. All materials used in the design are selected for compatibility with all possible environmental conditions during normal, accident, or post-accident periods. Spare electrical penetration sleeves are provided for possible future uses. This group also includes the electrical penetrations on each Residual Heat Removal and Containment Spray valve chamber. For these penetrations, the exterior portion of the conduit/pipe sleeve, which is welded to the valve chamber, and the conductor seal provides the pressure retaining boundary.

A fuel transfer penetration is provided to transport fuel assemblies between the refueling cavity in the Containment and the fuel transfer canal in the Fuel Handling Building. This penetration consists of a 20 in. diameter stainless steel pipe installed inside a 26 in. penetration sleeve. The inner pipe acts as the transfer tube and is fitted with a double-gasketed blind flange in the refueling cavity and a standard gate valve in the fuel transfer canal. The transfer tube is considered to be a pipe assembly and is evaluated as a mechanical component for License Renewal in Subsection 2.3.3.49. The penetration sleeve is welded to the steel liner and anchored into the concrete wall. Refer to the description in FSAR Section 3.8.2.1.4.1. Bellows expansion joints are provided to compensate for any differential movement between the structures, due to operating thermal expansion and seismic movements.

Four valve chambers and their appurtenances are included as shown on FSAR Figures 3.8.1-21 and 6.2.2-1. These function as a secondary containment boundary to completely enclose the containment sump lines and isolation valves. The valve chambers consist of the chambers, the expansion bellows, and the access hatches to the valve chambers.

The Anchorage/Embedments commodity includes components which are completely encased in concrete. This specifically includes the embedded portion of the anchorages used to support components and commodities.

The Penetration Bellows commodity group comprises the flexible seal plates that perform a thermal expansion function and seal the annular gap between the process pipe and the Type II containment penetration sleeves. These bellows are located outside the Containment cylinder wall, are not part of the containment pressure boundary, and do not perform any intended functions for License Renewal. Also included in this commodity group are the bellows or expansion joints associated with and located in the valve chambers.

Non-metallic Commodities

A waterproofing membrane is located below the basemat and working slab and terminates at water stops at the joints with adjacent structures. The seismic gaps between adjacent structures are cut off from groundwater by double rows of horizontal water stops. This prevents intrusion of moisture against the inaccessible portions of the containment structure liner below the base slab. Also, a moisture barrier seal is provided inside containment to prevent the intrusion of moisture between the containment liner plate and the concrete floor foundation mat.

Seals or gaskets are utilized for various containment penetrations including the equipment hatch, personnel and emergency airlocks, electrical penetrations, and penetrations for refueling access, containment testing, and containment purge supply and exhaust.

Insulation is provided on various piping going through pipe penetrations. Type I mechanical piping hot penetrations have insulation installed to prevent high temperature conditions in the concrete surrounding the penetrations. In addition, several Type II cold penetrations have insulation installed, but this insulation is not in the scope of License Renewal, because the concrete surrounding the penetration will always be below the maximum local area temperature of 200°F.

2.4.1.2 Containment Internal Structures

The Containment Structure encloses the concrete and structural steel components that make up the Containment Internal Structures. The Containment Internal Structures provide support for the Nuclear Steam Supply System (NSSS) equipment during all operational phases. In the unlikely event of an accident, these structures provide a mitigating function by protecting safety related equipment from the effects of the accident.

Concrete Commodities

The concrete internal structures, consisting of the primary and secondary shield walls and other concrete enclosures, form compartments within which the RCS is located. The main components are:

1. Primary shield wall,
2. Secondary shield walls,
3. Fuel storage area,
4. Refueling pool,
5. Reactor internals laydown areas,

6. Enclosure walls around the Pressurizer and Steam Generators,
7. Concrete walls and floors,
8. Concrete foundations/pedestals for steel floors, stairs, and platforms,
9. Concrete foundations/pedestals for Reactor Vessel supports,
10. Concrete foundations/pedestals for Steam Generator supports, and
11. Concrete foundations/pedestals for Reactor Coolant Pump supports.

Containment internal structures are shown on FSAR Figures 3.8.3-1 and 3.8.3-2.

The reinforced concrete primary shield wall, that surrounds the Reactor Vessel (RV) and encloses the reactor cavity, extends from the top of the internal foundation mat to the top of the operating floor. The continuation and extension of this wall above the elevation of the RV head flange forms the sides of the steam generator (SG) compartments, fuel storage area, refueling pool, and reactor internals laydown areas.

The primary shield wall provides biological shielding during normal operation, functions as a missile shield, provides a support structure for the reactor vessel, and for intermediate platforms, and provides support for pipe whip restraints.

The secondary shield walls consist of two half-cylindrical reinforced concrete structures which enclose the SGs, reactor coolant pumps (RCPs), and reactor coolant system (RCS) piping on each side of the reactor vessel. A divider wall between the primary and secondary shield walls separates the pressurizer from the adjacent SG.

The secondary shield wall provides biological shielding during normal operation, functions as a missile shield, provides a support structure for the operating floor and for intermediate platforms, and provides support for pipe whip restraints.

The refueling pool and reactor internals laydown areas are located within a rectangular enclosure formed by reinforced concrete walls and floors. For the refueling process, the pools are filled with water. A stainless steel liner is provided on the interior faces of these areas to make them watertight. A permanent stainless steel seal ring over the reactor cavity, connected to the RV flange and pool floor liner, keeps the reactor cavity dry. The liner and seal ring are included with the steel commodity group. The refueling pool provides biological shielding and a completely watertight compartment in which to carry out the refueling process and transfer of fuel rods from the RV and provides a support structure for the operating floor and the intermediate platforms.

The concrete and steel internal structures are supported on a concrete internal foundation mat that is 5 ft. thick and rests on top of the concrete containment structure basemat. The internal foundation mat is 1 ft. 6 in. thick in the Reactor Vessel Cavity and 6 in. thick in the Containment Sump. Under the internal foundation mat, the steel liner plate is sandwiched between the internal foundation mat and the basemat. All vertical walls are embedded into the internal mat; no anchorages penetrate through the liner plate and into the external mat. Shear keys are provided at the bottom of the walls in order to allow the transfer of radial and tangential shears from the walls into the internal mat.

The SGs are enclosed between the primary and secondary shield walls up to the operating floor, and within 4 ft. thick concrete walls above the operating floor to approximately elevation 305 ft.

The Pressurizer enclosure consists of reinforced concrete walls, supporting floor, and removable roof; these form a compartment within which the Pressurizer is enclosed. An open area is provided at the top for pressure relief in the event of a pressure differential between the enclosure and the surrounding space. The Pressurizer enclosure provides biological shielding during normal operation and also serves to contain potential missiles which may be generated as a result of equipment failure within the enclosure.

Other concrete structures inside containment include concrete floors, beams, piers, pedestals, shield walls, hatch blocks, curbs, and structural grout.

Masonry walls are included in the Containment Internal Structures. The masonry block walls are used for radiation shielding and also provide a measure of shelter/protection for equipment. Although the masonry block walls have been designed for seismic loading, they are not designated as seismic Category I. No attachment loads are permitted for seismically designed shielding block walls. The design criteria utilized in the design of masonry walls located in seismic Category I structures complies with the NRC Structural Engineering Branch Criteria for Safety Related Masonry Wall Evaluation, dated July 1981.

Steel Commodities

Main floors in the Containment are linked by stairs and one service elevator. Except for equipment laydown areas, floors and stairs are of grating construction to minimize the effects of pressure differentials across their boundaries should a sudden change in pressure occur. Structural steel framing is supported by the secondary shield wall and by steel columns. The structural steel commodity group includes the structural steel which provides support for the main grating floors and the concrete areas, the bolting and exposed portions of anchorages. In addition, the monorails that support monorail hoists and polar crane support girders and brackets are included in this commodity group. This commodity also includes the support steel and monorail for the Integrated Reactor Vessel Head Cable Bridge Hoist located on the operating floor.

The Containment includes a Polar Crane, which is a 250-ton circular bridge crane with a 50-ton Auxiliary Hoist, two 5-ton Jib Cranes, and a Manipulator Crane, all of which are in the scope of License Renewal. The Polar Crane, with Auxiliary Bridge, the Jib Cranes, and Manipulator Crane are classified as non-safety related, augmented quality equipment. Structural components of cranes, such as rails, structural members, and attachments to the structure, are included as components/commodities of the structure where they are located; therefore, the structural components of the Polar Crane are addressed as part of the Containment Building structure. The Polar Crane with Auxiliary Bridge and the Jib Cranes are heavy load-handling cranes.

Containment internal steel supports include the supports for the RCS primary components, including the RV, SGs, Pressurizer, RCPs, ASME Class 1, 2, and 3 piping and components, and non-ASME piping and components. FSAR Section 5.4.14 provides further information regarding the supports for the RCS Components.

Other steel commodity groups include platforms, pipe whip restraints, jet impingement shields, masonry wall supports, and miscellaneous structures. The latter include radiation shielding steel consisting of welded boxes containing lead shot, the incore instrumentation seal table guide plate, vortex suppressors, the spiral staircase, and other safety related or seismically designed steel structures. The containment normal sump screens, cover, and stainless steel support steel are included in miscellaneous structures. Two independent sumps serve as reservoirs and provide suction to the Residual Heat Removal and Containment Spray pumps during the recirculation mode of Emergency Core Cooling System (ECCS) operation. Each sump is covered with a removable checker plate steel cover fastened to the support steel by stainless steel screws. These components are included in miscellaneous structures, while the stainless steel recirculation sump screens are in the sump screens commodity group.

Other steel commodity groups include the following commodities and associated supports: cable tray and conduit, HVAC ducts, racks, panels, cabinets, floor drains, fire hose stations, fuel transfer tube bellows assembly, refueling pool liner, non-fire doors, support members and anchorages, the integrated reactor vessel head steel assemblies, and HVAC damper mountings.

Non-Metallic Commodities

The O-ring gaskets for the cavity seal ring hatch covers are included in this commodity group. The gaskets are replaced each refueling outage prior to flood-up of the reactor cavity and, therefore, are not long-lived. Therefore, these gaskets do not require an aging management review. Also included in this commodity group are the silicone gaskets used between the checkered plate and structural steel inside containment.

2.4.1.3 Containment Building Functions

Based on the above information, the Containment Building provides shelter and support for plant equipment within the scope of License Renewal. Also, the Containment Structure and Containment Internal Structures were considered a passive heat sink in containment pressure-temperature analyses. The Containment Building provides a barrier to fission product release following postulated design basis accidents. Containment Building structures provide barriers to fire, flooding, water spray, high energy fluid release, and potential missiles.

Based on the results of the HNP scoping and screening review, the Containment Building performs the following intended functions:

C-1	Structural Pressure Boundary
C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-11	Pipe Whip Restraint / HELB Shielding
C-12	Heat Sink
C-13	Direct Flow
C-14	Shielding
C-15	Expansion/Separation

The Containment Building is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Containment Building is described in Sections 3.8.1, 3.8.2, 3.8.3, and 6.2.1 of the HNP FSAR. Major Primary Containment structures are shown on Figures 3.8.1-1, 3.8.3-1, and 3.8.3-2. The location of the Containment Building is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Containment Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in

Table 3.5.2-1: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Containment Building.

TABLE 2.4.1-1 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedment	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Concrete: Above Grade – Dome; Wall; Ring Girder; Basemat	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink C-14 Shielding
Concrete: Below Grade – Wall; Basemat	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink C-14 Shielding
Concrete: Containment Internal	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink C-13 Direct Flow C-14 Shielding
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation; subfoundation	C-2 Structural Support for Criterion (a)(1) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Expansion Bellows	C-15 Expansion/Separation
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Insulation (Hot Pipe Penetrations)	C-3 Shelter, Protection

TABLE 2.4.1-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Integrated Reactor Vessel Head Steel Assemblies	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Jib Cranes	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-3 Shelter, Protection C-14 Shielding
Non-Fire Doors	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Penetration Bellows	C-1 Structural Pressure Boundary C-15 Expansion/Separation
Penetration Sleeves	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Personnel Airlock; Equipment Hatch; Personnel Emergency Airlock (Includes passive components)	C-1 Structural Pressure Boundary C-3 Shelter, Protection
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-11 Pipe Whip Restraint/HELB Shielding C-12 Heat Sink C-13 Direct Flow C-14 Shielding
Polar Crane	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Reactor Cavity Manipulator Crane	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals, Gaskets, and Moisture Barriers	C-1 Structural Pressure Boundary C-3 Shelter, Protection
Steel Components: All structural steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Steel Components: Fuel Pool Liner (including attachments)	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

TABLE 2.4.1-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CONTAINMENT BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Steel Elements: Liner; Liner Anchors; Integral Attachments	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Sump Screens	C-2 Structural Support for Criterion (a)(1) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components C-12 Heat Sink
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink
Supports for Reactor Coolant System Primary Components (includes RV, SG, Pressurizer, RCP)	C-2 Structural Support for Criterion (a)(1) components C-12 Heat Sink

2.4.2 OTHER CLASS I AND IN-SCOPE STRUCTURES

The following structures are included in this Subsection:

1. Reactor Auxiliary Building (Subsection 2.4.2.1)
2. Auxiliary Reservoir Channel (Subsection 2.4.2.2)
3. Auxiliary Dam and Spillway (Subsection 2.4.2.3)
4. Auxiliary Reservoir (Subsection 2.4.2.4)
5. Auxiliary Reservoir Separating Dike (Subsection 2.4.2.5)
6. Cooling Tower (Subsection 2.4.2.6)
7. Cooling Tower Makeup Water Intake Channel (Subsection 2.4.2.7)
8. Circulating Water Intake Structure (Subsection 2.4.2.8)
9. Diesel Generator Building (Subsection 2.4.2.9)
10. Main Dam and Spillway (Subsection 2.4.2.10)
11. Diesel Fuel Oil Storage Tank Building (Subsection 2.4.2.11)
12. Emergency Service Water and Cooling Tower Makeup Intake Structure (Subsection 2.4.2.12)
13. Emergency Service Water Discharge Channel (Subsection 2.4.2.13)
14. Emergency Service Water Discharge Structure (Subsection 2.4.2.14)
15. Emergency Service Water Intake Channel (Subsection 2.4.2.15)
16. Fuel Handling Building (Subsection 2.4.2.16)
17. HVAC Equipment Room (Subsection 2.4.2.17)
18. Outside the Power Block Structures (Subsection 2.4.2.18)
19. Main Reservoir (Subsection 2.4.2.19)
20. Security Building (Subsection 2.4.2.20)

21. Emergency Service Water Screening Structure (Subsection 2.4.2.21)

22. Normal Service Water Intake Structure (Subsection 2.4.2.22)

23. Switchyard Relay Building (Subsection 2.4.2.23)

24. Transformer and Switchyard Structures (Subsection 2.4.24)

25. Turbine Building (Subsection 2.4.2.25)

26. Tank Area/Building (Subsection 2.4.2.26)

27. Waste Processing Building (Subsection 2.4.2.27)

28. Yard Structures (Subsection 2.4.2.28)

2.4.2.1 Reactor Auxiliary Building

Description

The Reactor Auxiliary Building (RAB) consists of the Unit 1 Reactor Auxiliary Building (RAB-1), the Common Building (RAB-Common), and the completed part of the Unit 2 Reactor Auxiliary Building (RAB-2). The RAB-Common building includes the Control Room at floor elevation 305 ft. The Control Room is designed to provide a positive pressure, minimum air leakage envelope during normal plant operation and during design basis accidents. Control Room openings, such as, doors and penetrations, have a low-leakage design. An Emergency Service Water (ESW) Pipe Tunnel is at elevation 216 ft. and runs within the RAB-1 and RAB-Common through RAB-2. A Steam Tunnel houses Main Steam, Feedwater, and Auxiliary Feedwater System piping and runs from the Containment penetration area through the RAB-1 roof slab. The tunnel is approximately 40 ft. wide and includes a pipe restraint steel frame and a steel platform.

RAB-1 is a reinforced concrete structure, 207 ft. long by 187 ft. wide, varying in height from 69 ft. to 134 ft. from the top of foundation mat to the top of roof. The RAB-Common is a reinforced concrete structure, 120 ft. long by 187 ft. wide, with a height of 88 ft. from the top of the mat to the top of roof. The top of the foundation mat is at elevation 236 ft. except for the pipe tunnel area, which is at elevation 216 ft. RAB-1, RAB-2 and RAB-Common are supported on separate foundation mats 10 ft. thick which are founded on suitable rock. The floors are supported on beams and girders which are in turn supported on interior columns and/or exterior walls. Where interior shear walls are installed, the beams and girders are supported on the shear walls. Interior shielding walls and partitions, other than shear walls, are either reinforced concrete or concrete block, and are not load bearing.

The portions of RAB-2 that are in scope of License Renewal include the RAB-2 foundation mat and walls, ESW tunnel, the ESW Tunnel Penthouse, the retaining walls that separate the structure from backfilled areas, and the Access Bay structure. The Unit 2 RAB was changed to accommodate a single unit plant after cancellation of HNP Units 2, 3, and 4. The RAB-2 stepped foundation mat and the ESW Pipe Tunnel were constructed and have been stabilized against flotation by backfill to various elevations as shown in FSAR Figure 3.8.4-45. The backfill is topped by a concrete paving slab. The paving slabs located over backfilled areas are not considered a part of the RAB-2 and perform no License Renewal intended functions. Where required, exterior and interior walls of RAB-2 were constructed to retain both the plant grade backfill and the stepped backfill on top of the mat inside the building. A seismic Category I ESW Tunnel Penthouse was constructed on top of the pipe tunnel termination near the Unit 2 Tank Area/Building to protect and house the piping transition from the tunnel to the Tank/Area Building. The Penthouse is shown in Figure 2.2-1. An access to RAB-Common from the RAB-2 area was provided at elevation 236 ft. via an Access Bay, which is shown on FSAR Figure 3.8.4-45. The Access Bay structure and the retaining walls are seismically designed. Seismic analysis of the as-built RAB-2 was performed to obtain seismic response spectra for the structure to verify the design of safety related piping and systems within the structure.

RAB-1, RAB-2, and RAB-Common are independent and separated by sufficient gaps to preclude any interaction with one another due to seismic events. The buildings are also separated from adjacent structures by gaps, except between the Containment Building mat and the RAB mat at elevation 190 ft., which are placed against each other in order to prevent movement of the vertical cantilevered leg of the containment building mat. There are no adjacent non-Category I buildings which will impair the integrity of the seismic Category I RAB.

RAB-1 and RAB-Common house engineered safeguards and supporting systems, switchgear, sampling rooms, and the Control Room. The RAB-Common includes the Hot Machine Shop. Monorail Hoists and Bridge Cranes are included within the boundary of the RAB, but they perform no License Renewal intended functions.

The Operations Office Building, located on the roof of the RAB-Common, was evaluated for scoping as a separate structure. The Operations Office was determined to be not in the scope of License Renewal.

The HVAC Equipment Room is located on the roof of the RAB-Common but was evaluated for License Renewal as a separate structure. Refer to Subsection 2.4.2.17.

No portions of Units 3 and 4 RABs are in scope of License Renewal.

Based on the results of the HNP scoping and screening review, the RAB performs the following intended functions:

C-1	Structural Pressure Boundary
C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-11	Pipe Whip Restraint / HELB Shielding
C-13	Direct Flow
C-14	Shielding

The RAB is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The RAB is described in Sections 3.8.4.1.2, 3.8.4.9, and Figures 3.8.4-3 through 3.8.4-6 of the HNP FSAR. Portions of RAB-2 are shown on Figure 3.8.4-45. The location of the RAB is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the RAB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-2: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Reactor Auxiliary Building.

TABLE 2.4.2-1 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR AUXILIARY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Exterior Below Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-13 Direct Flow C-14 Shielding
Concrete: Roof Slab	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Control Room Ceiling	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Barrier Assemblies	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-1 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: REACTOR AUXILIARY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Fire Rated Doors	C-1 Structural Pressure Boundary C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Masonry Walls	C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Non-Fire Doors	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Phase Bus Enclosure Assemblies	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-11 Pipe Whip Restraint/HELB Shielding C-13 Direct Flow C-14 Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Raised Floor	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-1 Structural Pressure Boundary C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seismic Joint Filler	C-4 Fire Barrier
Steel Components: All structural steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.2 Auxiliary Reservoir Channel

Description

The Auxiliary Reservoir Channel is located northwest of the plant within the Auxiliary Reservoir and is approximately 1,570 ft. long and 140 ft. wide. Its walls have a slope of two horizontal to one vertical in soil and one horizontal to four vertical in rock. The Auxiliary Reservoir Channel connects the east and west arms of the Auxiliary Reservoir, allowing ESW discharge to flow from the east arm to the west arm before circulating back to the intake area. The longer flow path through the channel provides greater cooling of the water. The Auxiliary Reservoir Channel is designed and constructed to seismic Category I criteria.

The Auxiliary Reservoir Channel is included in the flow path for water circulating in the Auxiliary Reservoir and has the same functions as the Auxiliary Reservoir. The Auxiliary Reservoir serves as the water supply for the fire protection system and is the primary source of cooling water during emergency operation. It serves as the ultimate heat sink to dissipate the ESW System heat load.

Based on the results of the HNP scoping and screening review, the Auxiliary Reservoir Channel performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The Auxiliary Reservoir Channel is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Auxiliary Reservoir Channel is described in Sections 2.4.8, 2.5.0.6, and 9.2.5 of the HNP FSAR. Also refer to FSAR Figures 2.4.1-1 and 2.5.6-6. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Auxiliary Reservoir Channel components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-3: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir Channel.

TABLE 2.4.2-2 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY RESERVOIR CHANNEL

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.3 Auxiliary Dam and Spillway

Description

The Auxiliary Dam and Spillway are located across the Tom Jack Creek arm of the Main Reservoir, adjacent to the southwest boundary of the plant site. The Auxiliary Dam impounds a reservoir with a minimum normal water level at elevation 250 ft. and a surface area of approximately 317 acres. The Auxiliary Dam is a random rockfill dam approximately 3,903 ft. long, having a maximum structural height of approximately 72 ft., and a crest at elevation 260 ft. It has a core of compacted silty clay and clayey silt material protected on each side by a transition filter zone and a random rockfill shell. The downstream shell is provided with two horizontal drainage blankets, each 3 ft. thick, which are connected to the transition filter zone adjacent to the core of the dam. In addition, a 200 ft. wide, 3 ft. thick drainage layer is provided under the shell in each of two areas where pre-existing creeks had been located. The Spillway is an uncontrolled concrete ogee section with a crest length of 170 ft. and crest at elevation 252 ft. The ogee crest of the Spillway is joined to the stilling basin by a sloping apron.

The Auxiliary Reservoir serves the ESW System and is the water supply for the fire protection system. The Auxiliary Reservoir must remain operational under the safe shutdown earthquake condition. Consequently, the Auxiliary Dam is a seismic Category I structure.

Based on the results of the HNP scoping and screening review, the Auxiliary Dam and Spillway perform the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The Auxiliary Dam and Spillway are in the scope of License Renewal because they contain:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Auxiliary Dam and Spillway are described in Sections 2.5.0.6, 2.5.6, and 9.2.5 of the HNP FSAR. The Auxiliary Dam plan is shown on FSAR Figure 2.5.6-3 and a profile and sections are shown on FSAR Figure 2.5.6-4. The general plan and details of the Spillway are shown on FSAR Figures 3.8.4-37 and 3.8.4-38. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Auxiliary Dam and Spillway components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-4: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Dam and Spillway.

TABLE 2.4.2-3 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY DAM AND SPILLWAY

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.4 Auxiliary Reservoir

Description

The Auxiliary Reservoir is impounded by the Auxiliary Dam across the Tom Jack Creek Basin and is located to the west of the plant site. It has a minimum normal water level at elevation 250 ft. and a surface area of approximately 317 acres. An Auxiliary Separating Dike across the east arm of this reservoir acts as a barrier to prevent discharged ESW from flowing directly back to the ESW intake area. The Auxiliary Reservoir Channel conveys ESW from the east arm into the west arm of the reservoir so that maximum cooling can be attained before the discharged water circulates back to the intake area. The Auxiliary Reservoir must remain operative under the safe shutdown earthquake condition.

The Auxiliary Reservoir serves as the water supply for the fire protection system. The Auxiliary Reservoir is the primary sources of cooling water during emergency operation to dissipate the ESW System heat load and serves as the ultimate heat sink (UHS) for the plant.

Based on the results of the HNP scoping and screening review, the Auxiliary Reservoir performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The Auxiliary Reservoir is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Auxiliary Reservoir is described in FSAR Sections 2.4.8, 2.5.0.6, and 2.5.6, and a plan view is shown on FSAR Figure 2.4.1-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Auxiliary Reservoir components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in

Table 3.5.2-5: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir.

TABLE 2.4.2-4 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY RESERVOIR

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.5 Auxiliary Reservoir Separating Dike

Description

The Auxiliary Reservoir Separating Dike is located west of the power plant within the Auxiliary Reservoir and about 1,700 ft. north of the Auxiliary Dam, between the ESW intake area and the ESW discharge area. The Auxiliary Reservoir Separating Dike is approximately 1,200 ft. long and has a maximum height of approximately 55 ft. Its outside slopes are 2.5 horizontal to one vertical. The dike has a core of compacted silty clay and clayey silt material protected by a random rockfill shell that is graded near the core with the finer materials adjacent to the core. The Auxiliary Reservoir Separating Dike, along with the Auxiliary Reservoir Channel, controls the flow of discharged ESW through the east and west arms of the Auxiliary Reservoir. The dike, constructed across the east arm of the reservoir, prevents discharged ESW from flowing directly back to the ESW intake area. The Auxiliary Reservoir Separating Dike is designed and constructed to seismic Category I criteria.

The Auxiliary Reservoir Separating Dike is included in the flow path for water circulating in the Auxiliary Reservoir and has the same functions as the Auxiliary Reservoir. The Auxiliary Reservoir serves as the UHS for the plant and is the primary source of cooling water during emergency operation to dissipate the ESW System heat load. The Auxiliary Reservoir serves as the water supply for the fire protection system.

Based on the results of the HNP scoping and screening review, the Auxiliary Reservoir Separating Dike performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The Auxiliary Reservoir Separating Dike is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The Auxiliary Reservoir Separating Dike is described in FSAR Sections 2.5.0.6 and 2.5.6, and is shown on FSAR Figure 2.5.6-5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Auxiliary Reservoir Separating Dike components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-6: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir Separating Dike

TABLE 2.4.2-5 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: AUXILIARY RESERVOIR SEPARATING DIKE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.6 Cooling Tower

Description

The Cooling Tower (CT) is located east of the Turbine Building and approximately 550 ft. from the closest Seismic Category I structure, the Diesel Generator Building. The CT is a 523' tall, hyperbolic, natural draft, counterflow, evaporative-type tower. The CT Basin has an internal diameter of 405 ft. and is constructed of 10-in. thick concrete. The basin has a working capacity of approximately 5,400,000 gallons. The maximum depth is at the basin walls and is approximately 7.5 ft. Normal water level is approximately one foot below the top of the basin side walls.

Water returning from the condensers in the Turbine Building is routed to four concrete risers that extend upward from the distribution header inside the CT to a level above the CT fill assemblies. Water flows out of the risers into asbestos concrete distribution pipes. Attached to the bottom of the distribution pipes are polyethylene spray nozzles that spray water onto splash plates and onto the fill assemblies. The internals of the CT (i.e., fill, water distribution piping, spray nozzles, splash plates, and supports) are supported independently from the tower supports, on concrete posts.

The purpose of the CT is to provide a heat sink for the CWS and NSW System. Heated circulating water and service water are cooled by the counterflow, natural draft, hyperbolic cooling tower. The Cooling Tower Makeup Water pumps deliver water from the Main Reservoir to restore losses due to drift, evaporation, and blowdown. The CT is one of the major components of the CWS. Cooling water is routed from the CT Basin to the Circulating Water Pump Intake Structure. The NSW pumps also take suction from the CT Basin via a concrete intake box.

The CT is not a Class I structure and supports no safety related functions. However, the CT includes structures and components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The NSW System is credited for fire protection following postulated fires when the Emergency Service Water (ESW) System is unavailable.

Based on the results of the HNP scoping and screening review, the CT performs the following intended functions:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The CT is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The CT is described in Sections 10.4.5. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the CT components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-7: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Cooling Tower.

TABLE 2.4.2-6 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: COOLING TOWER

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Pipe	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.7 Cooling Tower Makeup Water Intake Channel

Description

The Cooling Tower (CT) Makeup Water Intake Channel extends from the Main Reservoir to the ESW & CT Makeup Intake Structure located southeast of the plant. The CT Makeup Water Intake Channel is approximately 2,500 ft. long and 45 ft. wide. The walls of the channel have a slope of two horizontal to one vertical in soil and one horizontal to four vertical in rock on the north side of the channel and two horizontal to one vertical in rock on the south side. The CT Makeup Water Intake Channel is a Class I structure.

During normal operation, the Main Reservoir is used as a storage reservoir and is primarily used as the source for CT makeup water. The Main Reservoir also serves as the alternative source of ESW supply.

Based on the results of the HNP scoping and screening review, the CT Makeup Water Intake Channel performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-12	Heat Sink

The CT Makeup Water Intake Channel is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events.

FSAR and Drawing References

The CT Makeup Water Intake Channel is described in Sections 2.5.6 and 3.8.4.1.12 of the HNP FSAR and is shown on FSAR Figures 2.4.1-1 and 2.5.6-28. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the CT Makeup Water Intake Channel components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-8: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Cooling Tower Makeup Water Intake Channel.

TABLE 2.4.2-7 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: COOLING TOWER MAKEUP WATER INTAKE CHANNEL

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-12 Heat Sink

2.4.2.8 Circulating Water Intake Structure

Description

The Circulating Water (CW) Intake Structure is located east of the power block and attached to the CT Basin. The structure is constructed of reinforced concrete and includes the reinforced concrete canal that extends from the CT Basin to the CW Intake Structure. The canal is approximately 104 feet wide at the basin and narrows to 66 ft. wide at the CW Intake Structure. The structure supports the CW pumps. The structure also includes the reinforced concrete slab and containment wall for the Sodium Hypochlorite Tank and Dispersant Tank adjoining the outside of the south wall of the canal.

The CW Intake Structure is not a Class I structure and supports no safety related functions. However, the CT includes structures and components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable. The fire protection function is supported by the structures and components CW Intake Structure that maintain the water volume in the CT Basin.

Based on the results of the HNP scoping and screening review, the CW Intake Structure performs the following intended functions:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The CW Intake Structure is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The CW Intake Structure is described in HNP FSAR Section 10.4.5 and shown on FSAR Figures 10.4.5-1 and 10.4.5-2. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the CW Intake Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-9: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Circulating Water Intake Structure.

TABLE 2.4.2-8 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: CIRCULATING WATER INTAKE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.9 Diesel Generator Building

Description

The Diesel Generator Building is located east of the Turbine Building. It is a reinforced concrete structure approximately 153 ft. long and 114 ft. wide and is constructed on concrete fill, founded on suitable rock. The Diesel Generator Building is constructed of cast-in-place concrete with reinforced concrete exterior and interior shear walls, and reinforced concrete floors. Interior walls, other than shear walls, are reinforced concrete walls or concrete masonry (block) walls and are not load bearing. The Diesel Generator

Building houses the two stand-by Diesel Generators, day tanks, silencers, and associated equipment.

The Diesel Generator Building is a seismic Category I, missile-proof, reinforced concrete structure and houses and protects safety related SSCs.

Based on the results of the HNP scoping and screening review, the Diesel Generator Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-13	Direct Flow

The Diesel Generator Building is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires and station blackout events.

FSAR and Drawing References

The Diesel Generator Building is described in Section 3.8.4.1.5 and is shown on Figure 3.8.4-20 of the HNP FSAR. The location of the Diesel Generator Building is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Diesel Generator Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-10: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building.

TABLE 2.4.2-9 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components . C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-2 Structural Support for Criterion (a)(1) components . C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components . C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-13 Direct Flow
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Rated Doors	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Masonry Walls	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Non-Fire Doors	C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-9 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL GENERATOR BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.10 Main Dam and Spillway

Description

The Main Dam and Spillway are located on Buckhorn Creek, approximately 0.7 miles south of its confluence with White Oak Creek, 4.5 miles south of the plant site and about 2.5 miles north of the Cape Fear River. The dam is a seismic Category I, zone embankment, rockfill structure. The Main Dam is approximately 1,550 ft. long. It is founded on rock and has a maximum height of approximately 108 ft. It has a core of compacted silty clay and clayey silt material protected on each side by two 8 ft. thick fine and coarse filter zones and a rockfill shell. The outside slopes are two horizontal to one vertical.

The Spillway is uncontrolled and consists of two ogee sections, each 25 ft. wide, separated by a concrete pier with a crest of 220 ft. The approach channel leading to the Spillway is cut into rock for a distance of approximately 200 ft. upstream of the ogee crest structure and in soil approximately 105 ft. further upstream. The invert and sides of the channel cut in rock are lined with concrete. The concrete lining has dowels across longitudinal and transverse contraction joints. The side lining and part of the invert lining adjacent to the ogee structure are secured to rock by rock anchors. The transverse contraction joints in the concrete lining are spaced at approximately 40 ft. centers. The invert and sides of the portion of the approach channel which is excavated entirely in soil is protected by riprap placed on bedding. Transverse drains, consisting of perforated concrete pipe placed in a trench filled with crushed rock, are located at each transverse joint in the invert lining in order to minimize uplift. The transverse drains lead to a longitudinal collector drain which has its outlet in the stilling basin. The side lining has drainage holes drilled into rock in order to relieve water pressure.

The primary purpose of the Main Dam is to impound water for the Circulating Water and Normal Service Water systems. The Main Dam impounds a reservoir with a normal water level at elevation 220 ft. and a water surface area of approximately 4,000 acres. During normal operation, the Main Reservoir functions as a storage reservoir and is used as the source of cooling tower makeup water. The Main Reservoir also serves as an alternative source of ESW supply.

Based on the results of the HNP scoping and screening review, the Main Dam and Spillway perform the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The Main Dam and Spillway are in the scope of License Renewal because they contain:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The Main Dam and Spillway are described in Sections 2.5.0.6 and 2.5.6 of the HNP FSAR. The Main Dam and Spillway are shown on FSAR Figures 2.5.6-1 and 3.8.4-34, and are located on FSAR Figure 2.4.1-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Main Dam and Spillway components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-11: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Main Dam and Spillway.

TABLE 2.4.2-10 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN DAM AND SPILLWAY

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-12 Heat Sink
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Structural Steel (Water Control Structures)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.11 Diesel Fuel Oil Storage Tank Building

Description

The Diesel Fuel Oil Storage Tank Building is located north of the Fuel Handling Building and consists of a below-grade reinforced concrete structure which provides for two reinforced concrete diesel oil tanks (or compartments) and two transfer pumps. The structure is 94 ft. long, 86 ft. wide, and 24 ft. high including the foundation mat; the top slab is at elevation 263 ft. Access to the pumps is provided by two stairwells located at each corner of one end of the building. The building is supported on a reinforced concrete foundation mat which is founded on sound rock. The mat is approximately 3 ft. thick. The two diesel fuel oil storage tanks or compartments on the east side have a capacity of 175,000 gallons each and are 66 ft. long, 21ft. wide, and 18.5 ft. high. The inside surfaces of the two east concrete compartments are lined with carbon steel to prevent leakage. The two west compartments reserved for Units 3 and 4 have not been lined with steel. These two tanks are not used for storage of diesel fuel oil. Waterproofing membrane is also provided on the outside face of the exterior walls to prevent groundwater pressure on the steel linings. A drainage system between the concrete walls and steel liner is provided for any leakage through the waterproofing membrane and/or concrete foundation mat. Each compartment is provided with an access manhole covered by a removable concrete cover and a vent pipe with a flame arrestor. The transfer pumps are housed in below grade cubicles separated by reinforced concrete walls.

The Diesel Fuel Oil Storage Tank Building is a seismic Category I, missile-proof, reinforced concrete structure and houses and protects safety related SSCs.

Based on the results of the HNP scoping and screening review, the Diesel Fuel Oil Storage Tank Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Diesel Fuel Oil Storage Tank Building is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires.

<u>FSAR and Drawing References</u>

The Diesel Fuel Oil Storage Tank Building is described in Sections 3.8.4.1 and 3.8.4.9 of the HNP FSAR. A general layout of the Diesel Fuel Oil Storage Tank Building is shown on FSAR Figure 3.8.4-22 and Figure 3.8.4-22a. The location of the Diesel Fuel Oil Storage Tank Building is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Diesel Fuel Oil Storage Tank Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-12: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Fuel Oil Storage Tank Building.

TABLE 2.4.2-11 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL FUEL OIL STORAGE TANK BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Rated Doors	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-11 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: DIESEL FUEL OIL STORAGE TANK BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.12 Emergency Service Water and Cooling Tower Makeup Intake Structure

Description

The Emergency Service Water and Cooling Tower (ESW & CT) Makeup Intake Structure is located at the northern end of the CT Makeup Water Intake Channel. Cooling water may be drawn from either the Auxiliary Reservoir or the Main Reservoir to the ESW & CT Makeup Intake Structure. Water drawn from the Auxiliary Reservoir is carried by a series of steel pipes from the ESW Screening Structure to the ESW & CT Makeup Intake Structure. Water is drawn from the Main Reservoir through the CT Makeup Water Intake Channel.

The structure is reinforced concrete and founded on sound rock. The ESW & CT Makeup Intake Structure has fourteen bays; however, it was changed from the original design to accommodate a one-unit plant. The eastern half of the ESW & CT Makeup Intake Structure was constructed as designed for two units. The other half was not completed. The incomplete bays are capped with a reinforced concrete deck. Two bays are used for cooling tower make-up pumps and two bays are used for the ESW System. Each ESW bay is 10 ft. 2 in. wide, sized for 8 ft. wide traveling screens. Each ESW bay contains one vertical ESW cooling pump. There are two screen bays which service two cooling tower makeup pumps. Each bay is sized for a 10 ft.-wide traveling screen. Each screen bay also contains one coarse screen, one stop log guide, and two fine screen guides. The screen bays containing ESW pumps have a concrete dividing wall with an 8 ft.-by-10 ft. butterfly valve. The dividing wall and butterfly valve arrangement permits operation of the ESW pumps from either the Main or Auxiliary Reservoir. Access manholes, ladders, and platforms are provided into the intake pump structure between the coarse screen and the traveling screens for access to the butterfly valves and pump wells. Screen wash pumps are located on the structure. A skimmer wall is provided across the front face of the intake to prevent floating trash and ice from entering the structure. The valve pit, located at the rear of the structure, contains discharge piping, butterfly valves, expansion joints, and strainers. A reinforced concrete enclosure covers the deck to protect ESW equipment from tornado missiles.

The ESW & CT Makeup Intake Structure is extended to include the retaining walls at the south end of structure, but does not include the electrical manholes at the east and west ends of the structure and the CT Makeup Strainer Pit at the northeast end of the structure.

The ESW & CT Makeup Intake Structure is a seismic Category I, missile-proof, reinforced concrete structure and houses and protects safety related SSCs.

Based on the results of the HNP scoping and screening review, the ESW & CT Makeup Intake Structure performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier

The ESW & CT Makeup Intake Structure is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires.

FSAR and Drawing References

The ESW & CT Makeup Intake Structure is described in Sections 3.8.4.1.12 and on Figures 3.8.4-28 through 3.8.4-31 and 3.8.4-41 of the HNP FSAR. The location of the

ESW & CT Makeup Intake Structure is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the ESW & CT Makeup Intake Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-13: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – ESW & CT Makeup Intake Structure.

TABLE 2.4.2-12 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ESW & CT MAKEUP INTAKE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier

TABLE 2.4.2-12 (continued)COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ESW & CT MAKEUP INTAKE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components
Fire Barrier Penetration Seals	C-4 Fire Barrier
Non-Fire Doors	C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.13 Emergency Service Water Discharge Channel

Description

The ESW Discharge Channel is located northwest of the plant. The ESW Discharge Channel is approximately 2,170 ft. long and varies in width from 50 ft. to 80 ft. The channel walls have a slope of two horizontal to one vertical in soil and one horizontal to four vertical in rock. The ESW Discharge Channel is conservatively designed to carry the service flow required for normal and emergency shutdown of the plant. Water is returned to the Auxiliary Reservoir through the ESW Discharge Channel over a weir located in the ESW Discharge Structure. The ESW Discharge Channel is designed and constructed to seismic Category I criteria.

The ESW Discharge Channel is included in the flow path for water circulating back to the Auxiliary Reservoir; and, therefore, it has some of the same functions for providing cooling water as the Auxiliary Reservoir. The Auxiliary Reservoir, through the ESW Intake Channel, also serves as the water supply for the fire protection system. The Auxiliary Reservoir functions as the plant UHS and is the primary sources of cooling water during emergency operation to dissipate the ESW System heat load.

Based on the results of the HNP scoping and screening review, the ESW Discharge Channel performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The ESW Discharge Channel is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The ESW Discharge Channel is described in Sections 2.4.8, 2.5.0.6, 2.5.6, and 3.8.4.1.12 of the HNP FSAR. Also refer to FSAR Figure 2.4.1-1 and Figure 2.5.6-8. .A portion of the channel is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the ESW Discharge Channel components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-14: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Discharge Channel.

TABLE 2.4.2-13 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER DISCHARGE CHANNEL

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.14 Emergency Service Water Discharge Structure

Description

The ESW Discharge Structure is located at the east end of the ESW Discharge Channel. The ESW Discharge Structure is reinforced concrete and founded on sound rock. The structure has been constructed as designed with four bays. However, only two bays are used for the single-unit plant. The pipe penetrations in the east wall for the other bays have been closed off. The bottom mat is at elevation 240 ft. with a concrete curb to elevation 242 ft. and a concrete wall, or weir, to elevation 256 ft. The walls extend to elevation 262 ft. The overall dimensions are approximately 26.5 ft. by 51ft. Cooling water from the plant is returned to the Auxiliary Reservoir over a weir located in an ESW Discharge Structure through the ESW Discharge Channel. The ESW Discharge Structure is a seismic Category I, missile-proof, reinforced concrete structure.

The ESW Discharge Structure is included in the flow path for water circulating back to the Auxiliary Reservoir and, therefore, has some of the same functions for providing cooling water as the Auxiliary Reservoir. The Auxiliary Reservoir, through the ESW Intake Channel, also serves as the water supply for the fire protection system. The Auxiliary Reservoir functions as the plant UHS and is the primary sources of cooling water during emergency operation to dissipate the ESW System heat load.

Based on the results of the HNP scoping and screening review, the ESW Discharge Structure performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-12	Heat Sink

The ESW Discharge Structure is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The ESW Discharge Structure is described in FSAR Section 3.8.4.1.12 and 3.8.4.9 and is shown on FSAR Figure 3.8.4-32. The location of the ESW Discharge Structure is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the ESW Discharge Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-15: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Discharge Structure.

TABLE 2.4.2-14 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER DISCHARGE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-12 Heat Sink
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-12 Heat Sink

2.4.2.15 Emergency Service Water Intake Channel

Description

The ESW Intake Channel is located southwest of the plant and extends from the Auxiliary Reservoir to the ESW Screening Structure. The intake channel is approximately 3,580 ft. long and 50 ft. wide. The bottom of the channel slopes down to elevation 231 ft at the Intake Screening Structure. The channel walls have a slope of two horizontal to one vertical in soil and one horizontal to four vertical in rock. The ESW Intake Channel is conservatively designed to carry the water flow required for normal and emergency shutdown of the plant. The ESW Intake Channel is designed and constructed to seismic Category I criteria.

The ESW Intake Channel is included in the flow path for water circulating from the Auxiliary Reservoir to the ESW Screening Structure and has the same functions for providing cooling water as the Auxiliary Reservoir. The Auxiliary Reservoir, through the ESW Intake Channel, also serves as the water supply for the fire protection system. The Auxiliary Reservoir functions as the plant UHS and is the primary sources of cooling water during emergency operation to dissipate the ESW System heat load.

Based on the results of the HNP scoping and screening review, the ESW Intake Channel performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-12	Heat Sink

The ESW Intake Channel is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The ESW Intake Channel is described in FSAR Sections 2.4.8, 2.5.0.6, 2.5.6, and 3.8.4.1.12. Also refer to Figures 2.4.1-1 and 2.5.6-7 of the HNP FSAR. A portion of the ESW Intake Channel is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the ESW Intake Channel components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-16: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Intake Channel.

TABLE 2.4.2-15 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER INTAKE CHANNEL

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-12 Heat Sink

2.4.2.16 Fuel Handling Building

Description

The Fuel Handling Building (FHB) is a reinforced concrete, seismic Category I structure, supported on a 10 ft. thick foundation mat founded on suitable rock. The exterior walls, shear walls, interior columns, and floor slabs are cast-in-place reinforced concrete structures. Interior shielding or partition walls, other than shear walls, are either reinforced concrete or concrete block and are not load bearing.

The foundation for the FHB is on two levels; the top of the central portion of the mat is at elevation 236 ft., while the top of both ends of the building mat are at elevation 216 ft. There are two half-circular sections at each side of the foundation (one for each Unit's containment structure), with shear keys underneath the circular portions (refer to FSAR Figure 3.8.4-13). Heavily reinforced concrete walls are provided at the mat level in order to support the fuel pools and superstructure. The exterior walls are waterproofed on the backfilled faces from the top of the mats up to one foot below grade level. All construction joints in exterior walls in contact with backfill have water stops.

The northern-most section of the FHB is designated as the unloading area. It provides access for railroad cars for shipping spent and new fuels. It is a narrow building 95 ft. long, 50 ft. wide, and 105 ft. high. The top of the mat is at elevation 237 ft. The substructure is filled with sand in order to provide sufficient weight at the lower portion of the building for stability. It provides the necessary access facilities for railroad cars on which spent fuel shipping casks will be loaded or for any large vehicle that might require access to the building. The unloading area is a reinforced concrete structure, and the exterior walls below grade are waterproofed.

The FHB consists of the following major areas/components:

1. Spent Fuel Pools,
2. New Fuel Pool,
3. Fuel Transfer canal,
4. Unloading Bay Area,

5. Cranes (Fuel Handling Bridge Crane, Fuel Cask Handling Crane, FHB Auxiliary Crane),
6. Secondary waste equipment, and
7. Equipment for the RAB.

The FHB houses facilities for storing, moving, and handling both new fuel and spent fuel; secondary waste equipment, such as evaporators, demineralizers, heaters, condensers and associated pumps, filters, and control panels; and equipment for the Reactor Auxiliary Building, such as recycle evaporators, recycle holdup tanks, and heating, ventilating, and air conditioning ducts and associated pumps, filters, and hydrogen purge unit. The FHB also provides radiation shielding at the Fuel Pool, the transfer canal and at the fuel transfer tube. The FHB includes a Fuel Handling Bridge Crane, Fuel Cask Handling Crane, and a FHB Auxiliary Crane which are in the scope of LR. The Fuel Handling Bridge Crane is classified as safety related. The Fuel Cask Handling and FHB Auxiliary Cranes are classified as non-safety related, augmented quality. The civil components of the cranes are included as part of the structure where they are located. The Cask Handling Crane and the Auxiliary Crane are heavy load-handling cranes.

The spent fuel storage facilities consist of three spent fuel pools. The fuel pools are cast-in-place reinforced concrete structures lined with stainless steel plate. Two of the spent fuel pools are 50 ft. long, 27 ft. wide, and 40 ft. deep. The third is 32 ft. long, 20 ft. wide, and 40 ft. deep. The fuel transfer canal, which interconnects the spent fuel pools, is 300 ft. long, 3 ft. wide, and 26 ft. deep, and lined with stainless steel plate. A flexible expansion joint is provided between the Containment Building fuel transfer tube and the FHB fuel transfer canal to compensate for any differential movement due to operating thermal expansion and seismic movements.

Spent fuel is transferred from the Containment Building to the pools via the fuel transfer tube and through the fuel transfer canal. The fuel elements are handled by the Fuel Handling Bridge Crane. The spent fuel is transferred to spent-fuel shipping casks, which are handled by a separate 150 ton capacity Fuel Cask Handling Crane, which runs on rails supported by wall brackets.

The new-fuel storage facility consists of one new fuel pool which is 38 ft. long, 13 ft. wide, and 40 ft. deep (north new fuel pool). The new fuel pool is lined with stainless steel plate. New fuel elements are handled by the Fuel Handling Bridge Crane and are transferred to the Containment Building via the fuel transfer canal and the fuel transfer tube.

Changes were made to plant configuration as a result of the cancellation of Units 2, 3, and 4 as described in FSAR Section 3.8.4.9. In order to retain the seismic characteristics and to maintain the structural integrity of the building, the major structural components of the building, namely, foundation mat, floor slabs, and shear and load bearing walls, have been constructed as designed for four units. Only the internal non-load bearing walls and some penetrations and openings in the slabs and walls have been modified in the area which was reserved for Units 2, 3 and 4. Since Units 2, 3 and 4 Reactor Auxiliary Buildings and Containment Buildings have been cancelled, the FHB has been isolated from the plant grade fill by a retaining wall on the west side and a series of retaining walls on the east side where required. The building stability and structural design have been reviewed for additional wind and tornado loads to satisfy the design criteria. The retaining walls west and east of the Fuel Handling Building have been seismically designed.

Design criteria have been used to assure that the collapse of adjacent non-seismic Category I structures would not impair the integrity of the seismic Category I structures or components should an earthquake occur.

The FHB includes within its boundary Tool Room #2.

For LR scoping purposes, the FHB was subdivided to include a new structure identified as Outside the Power Block (OPB) Structures. OPB Structures include the portion of the FHB where no safety related equipment is located. This corresponds to the portion west of "N" line wall, and east of "L" line wall north of Column Line 45. The OPB Structures are described in Subsection 2.4.2.18.

Based on the results of the HNP scoping and screening review, the FHB performs the following intended functions:

C-1	Structural Pressure Boundary
C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-10	Absorb Neutrons
C-14	Shielding
C-15	Expansion/Separation

The FHB is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. SCs that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The FHB is described in Sections 3.8.4.1.3, 3.8.4.9, and 3.8.5.1.3 of the HNP FSAR. The building is shown on Figures 3.8.4-7 through 3.8.4-14 and 3.8.5-6. The location of the FHB is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the FHB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-17: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building.

TABLE 2.4.2-16 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Canal and Pool Gates	C-1 Structural Pressure Boundary
Concrete: Exterior Above Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Exterior Below Grade	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-16 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Interior	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Roof Slab	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Damper Mountings	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Expansion Bellows	C-15 Expansion/Separation
Fire Barrier Assemblies	C-4 Fire Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Rated Doors	C-1 Structural Pressure Boundary C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-8 Flood Barrier
Fuel Cask Handling Crane	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fuel Handling Bridge Crane	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fuel Handling Building Auxiliary Crane	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
New Fuel Storage Rack	C-2 Structural Support for Criterion (a)(1) components C-10 Absorb Neutrons
Non-Fire Doors	C-1 Structural Pressure Boundary C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding

TABLE 2.4.2-16 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: FUEL HANDLING BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-1 Structural Pressure Boundary C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seismic Joint Filler	C-4 Fire Barrier
Spent Fuel Storage Racks	C-2 Structural Support for Criterion (a)(1) components C-10 Absorb Neutrons
Steel Components: Fuel Pool Liner (including attachments)	C-1 Structural Pressure Boundary C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.17 HVAC Equipment Room

Description

The HVAC Equipment Room is located on the roof of the RAB-Common structure. The HVAC Equipment Room is a pre-engineered metal siding building which is used for housing HVAC equipment for the computer and communications rooms. Emergency Response Facility Information System equipment is also located within the structure. There are battery racks and batteries located within a masonry enclosure in the building. The steel framing is anchored to the elevation 324 ft. roof slab on the RAB Common area roof. There is a fire protection hose rack inside. However, the HVAC Equipment Room is supported on a fire barrier slab which isolates it from the Control Room area. The building is not a Class I structure and supports no safety related functions.

The collapse of any non-seismic Category I structure such as the HVAC Equipment Room will not impair the integrity of adjacent seismic Category I structures or components.

Based on the results of the HNP scoping and screening review, the HVAC Equipment Room performs the following intended functions:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The HVAC Equipment Room is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires and station blackout events.

FSAR and Drawing References

The HVAC Equipment Room is described in Sections 9.4.9 of the HNP FSAR. The location of the HVAC Equipment Room is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the HVAC Equipment Room g components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-18: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – HVAC Equipment Room.

TABLE 2.4.2-17 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: HVAC EQUIPMENT ROOM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Non-Fire Doors	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-17 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: HVAC EQUIPMENT ROOM

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Roof-Membrane / Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Siding	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.18 Outside the Power Block Structures

Description

The designation Outside the Power Block (OPB) Structures was created during the License Renewal review to refer to portions of the main plant structures that are safety related themselves but that have no safety related components located in them. The OPB Structures are defined as those portions of the power block structures that are west of column line N between column lines 27 and 73; and east of column line L between column lines 45 and 73. The common N, L, 45 line walls between the OPB and the FHB are included and scoped as part of the FHB in Subsection 2.4.2.16. No safety related equipment is located west of the N line wall, and east of the L line wall north of column line 45. Refer to Figure 2.4-1.

OPB Structures include the retaining wall and deadmen west of the FHB and a portion of the east retaining wall. The west retaining wall is constructed approximately 11 ft. west of column line R from approximately column lines 12 to 73. Since Units 2, 3, and 4 RAB and Containment Buildings were cancelled, the FHB was isolated from the plant grade fill by the retaining wall on the west side and a series of retaining walls on the east side which are further described in Subsection 2.4.2.1. Each retaining wall is seismically designed. The retaining wall west of the FHB has been physically separated from the building by a gap of three feet along the length of the wall and a gap of approximately three inches at the north end. The west retaining wall consists of two rows of reinforced concrete pipes erected one over the other and a reinforced concrete wall on top of the pipes. The pipes are filled with concrete and are held back by Tie Rods and concrete deadmen. The portion of the east retaining wall that would be located in the Unit 2 RAB, if constructed, is included with the RAB structure.

OPB Structures are defined to include the Unit 2 Containment Building concrete mat as shown on FSAR Figure 3.8.4-45. The Unit 2 Containment Building concrete mat was completed after the cancellation of Units 2, 3, and 4. The mat is used to provide support for the east retaining wall as discussed above. The mat has been stabilized against flotation by backfill which is topped by a concrete slab. The concrete mat is inaccessible unless excavation of backfill is performed.

Included in the OPB Structures are the Technical Support Center (TSC) and the Firehouse. The TSC is located in the portion of the FHB which is not used for Unit 1. The Firehouse consisting of office space used by Operations Fire Protection Personnel, is located in the cancelled portion of the Unit 4 Fuel Handling Building.

The OPB Structures have no safety related components within their boundaries, as discussed above, but the structural components of OPB Structures are required to maintain the conditions of structural design of the Fuel Handling Building, the Reactor Auxiliary Building, and the Waste Processing Building.

Although The OPB Structures contain fire protection-related components, they do not have any fire protection intended functions. This is consistent with the site conformance position regarding NRC Branch Technical Position CMEB 9.5-1, paragraph C.7.r, i.e., that a fire, or the effects of fire, in miscellaneous areas will not adversely affect any safety related systems or equipment. The common walls between the OPB Structures and the FHB are the exterior walls of the Fuel Handling and Reactor Auxiliary Buildings. Since these walls are 3-hour fire barriers, the effects of a fire in the OPB Structures would not adversely affect any safety related systems or equipment in the Fuel Handling Building or the RAB.

Based on the results of the HNP scoping and screening review, the OPB Structures perform the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The OPB Structures are in the scope of License Renewal because they contain:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions.

FSAR and Drawing References

The OPB Structures are not described in the FSAR but were defined to support the License Renewal review. The location of the OPB Structures is shown on Figure 2.4-1.

Components Subject to Aging Management Review

The table below identifies the OPB Structures components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-19: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Outside the Power Block Structures.

TABLE 2.4.2-18 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: OUTSIDE THE POWER BLOCK STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure) This commodity group includes only the Tie Rods used on the west retaining wall.	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.19 Main Reservoir

Description

The Main Reservoir was formed by the construction of a seismic Category I dam and spillway on Buckhorn Creek to form a lake of approximately 4,000 acres at the normal water level of 220 ft.

During normal operation, the main reservoir is used as a storage reservoir and is primarily used as the source for CT makeup water. The Main Reservoir also serves as the alternative source of ESW supply or UHS cooling water.

The Technical Specification minimum Main Reservoir level is 215 ft. This assures that water requirements are met for safety related heat exchangers, cooled by the ESW System. The unit will be shutdown if the water level in the Main Reservoir falls below 215 ft.

Based on the results of the HNP scoping and screening review, the Main Reservoir performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-5	Shutdown Cooling Water
C-12	Heat Sink

The Main Reservoir is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events.

FSAR and Drawing References

The Main Reservoir is described in Sections 2.4.8, 2.5.0.6, and 2.5.6 of the HNP FSAR. The Main Reservoir is shown on FSAR Figure 2.5.1-10. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Main Reservoir components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-20: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Main Reservoir.

TABLE 2.4.2-19 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: MAIN RESERVOIR

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Earthen Water-Control Structures: Dams, embankments, reservoirs, channels, canals and ponds	C-2 Structural Support for Criterion (a)(1) components C-5 Shutdown Cooling Water C-12 Heat Sink

2.4.2.20 Security Building

Description

The Security Building is a non-seismic Category I structure located southeast of the Turbine Building and is the entrance to the protected area. The building is approximately 72 ft. wide by 246 ft. long. The building is constructed on a concrete footing and a concrete slab. The building includes masonry walls, a structural steel support system, and a combination of stone and metal siding as the fascia. The building houses the security metal detection, explosive detection, x-ray equipment, and turnstiles used to process personnel into the protected area. It also houses the personnel and security systems, used to protect the plant. Self-survey personnel monitoring equipment for health physics is housed in the building. The east portion of the building is built over an electrical cable trench that supports and protects electrical cables required for restoration from a station blackout event. The building includes equipment used for fire protection, which is the only reason that the Security Building is in the scope of License Renewal. The in-scope portions of the building include the Security Diesel Generator room, the switchgear room, battery room, and the room where the fire protection-related lighting panels are located.

Based on the results of the HNP scoping and screening review, the Security Building performs the following intended function:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Security Building is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The location of the Security Building is shown on Figure 2.2-1.

Components Subject to Aging Management Review

The table below identifies the Security Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-21: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Security Building.

TABLE 2.4.2-20 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SECURITY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack (includes spacers)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Roof Slab	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.21 Emergency Service Water Screening Structure

Description

The ESW Screening Structure is located at the eastern end of the ESW Intake Channel. The structure is of reinforced concrete construction. It contains eight bays separated by reinforced concrete walls. Only two bays are used for the ESW System. Each ESW bay is 8 ft. 2 in. wide and is sized for a 7 ft. wide traveling screen. In addition to a traveling screen, each bay contains one coarse screen, and one stop log guide, two fine screen guides, and access manholes. A valve pit containing butterfly valves and expansion joints is located at the rear of the structure. A reinforced concrete enclosure covers the deck to protect the traveling screens and valve pit from tornado missiles. A reinforced concrete skimmer wall, at the front of the intake structure extends to elevation 247.5 ft. and prevents ice and floating trash from entering the intake structure. Water is drawn from the ESW Intake Channel through the ESW Screening Structure and transported by gravity through steel pipes to the ESW & CT Makeup Intake Structure. The pipe penetrations against yard fill in the other bays have been closed off.

The ESW Screening Structure supports and protects the equipment that is intended to supply cooling water and fire protection water from the Auxiliary Reservoir. The structure was constructed as originally designed for a four unit site. However, only three bays are used for one unit: one bay is used for ESW, one bay is used for ESW and fire water supply, and one bay is used for fire water supply alone. The ESW pumps are located at the ESW & CT Makeup Intake Structure as discussed in Subsection 2.4.2.12.

One electric motor-driven fire pump and one diesel engine-driven fire pump, suitable for outdoor operation, are installed outdoors at opposite ends of the ESW Screening Structure. Two fire service screen wash pumps are installed on the ESW Screening Structure; they take suction from the Auxiliary Reservoir. Two fire protection jockey pumps are located on the structure. Also included in this structure are: (1) the concrete foundation, slab, and dike for the diesel engine driven fire pump and its diesel oil storage tank located south of the ESW Screening Structure, (2) the foundation and wall for the motor-driven fire pump and valve pit north of the ESW Screening Structure, and (3) the retaining walls at each end of the ESW Screening Structure. The dike around the diesel fuel oil storage tank is designed to contain fuel oil and direct the flow to a sump. The retaining walls are utilized to contain the earth adjacent to the concrete structure.

The ESW Screening Structure is a seismic Category I, missile-proof, reinforced concrete structure and houses and protects safety related SSCs.

Based on the results of the HNP scoping and screening review, the ESW Screening Structure performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-8	Flood Barrier
C-13	Direct Flow

The ESW Screening Structure is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires.

FSAR and Drawing References

The ESW Screening Structure is described in Section 3.8.4.1.12 of the HNP FSAR. The structure is shown on FSAR Figures 3.8.4-25 through 3.8.4-27 and Figure 3.8.4-33. Its location is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the ESW Screening Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-22: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Screening Structure.

TABLE 2.4.2-21 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier C-13 Direct Flow

TABLE 2.4.2-21 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-8 Flood Barrier
Fire Barrier Penetration Seals	C-4 Fire Barrier
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.22 Normal Service Water Intake Structure

Description

The Normal Service Water (NSW) Intake Structure is a reinforced concrete structure located east of the DG Building and north of the CT. The NSW Intake Structure is approximately 50 ft. by 44 ft. with four bays and supports two NSW pumps. Water is drawn from the CT Basin to the NSW Intake Structure via a 6 ft. diameter underground concrete pipe. In the vicinity of the NSW Intake Structure, the concrete pipe branches into three separate lines, two of which are routed to the NSW Intake Structure via 6 ft. by 10 ft. connections. The third pipe, that would have connected to HNP Unit 2, is terminated by a concrete plug and block. The NSW Intake Structure also includes the concrete slabs and containment walls surrounding the chemical tanks and prefabricated building located east of the NSW Intake Structure; however, these perform no intended functions for License Renewal.

The NSW Intake Structure is not a Class I structure and supports no safety related functions. However, the NSW Intake Structure includes structures and components relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48). The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

Based on the results of the HNP scoping and screening review, the NSW Intake Structure performs the following intended functions:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The NSW Intake Structure is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated fires.

FSAR and Drawing References

The NSW Intake Structure is not described in the HNP FSAR; however, its location is shown on the FSAR Figure 1.2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the NSW Intake Structure components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-23: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Service Water Intake Structure.

TABLE 2.4.2-22 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: NORMAL SERVICE WATER INTAKE STRUCTURE

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchor / Embedment	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.23 Switchyard Relay Building

Description

The Switchyard Relay Building is a prefabricated metal building located on a concrete slab. It supports, houses, and protects electrical equipment. It is located southeast of the Turbine Building inside the fenced 230 kilovolt (KV) switchyard. Supervisory control systems are located in the 230KV Switchyard Relay Building. These systems continuously transmit 230KV parameters to the Progress Energy Carolinas Control Center. The control of all 230KV circuit breakers associated with the generator and start-up transformers is administered from the plant Control Room. The switchyard is provided with two independent 125 volt direct current (DC) systems to furnish the control power for the circuit breakers. These systems are independent of the plant DC systems, and each consists of a 125 volt battery and battery charger, located in the Switchyard Relay Building. One additional battery charger is provided as a spare.

The Switchyard Relay Building is not a Class I structure.

Based on the results of the HNP scoping and screening review, the Switchyard Relay Building performs the following intended functions:

C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Switchyard Relay Building is in the scope of License Renewal because it contains:

1. SCs that are relied on during postulated station blackout events.

FSAR and Drawing References

The Switchyard Relay Building is discussed in Section 8.2 of the HNP FSAR. The location of the Switchyard Relay Building is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Switchyard Relay Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-24: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Switchyard Relay Building.

TABLE 2.4.2-23 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: SWITCHYARD RELAY BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Non-Fire Doors	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Siding	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.24 Transformer and Switchyard Structures

Description

The Transformer and Switchyard Structures include the 230KV switchyard and transformer structures, the isolated phase bus system support structures, and the 6.9KV non-segregated phase bus support structures.

The transformer yard structures are located east of the Turbine Building and include the foundations for the Main, Start-up, and Unit Auxiliary Transformers and the foundations and miscellaneous structural steel for supporting High-Voltage Insulators, the 230KV Low Pressure Oil-Filled Cables, and the Isolated Phase Bus System between the Transformers and the Turbine Building.

The foundations and walls that form a pit around the Main, Start-up, and Unit Auxiliary Transformers are in scope. These foundations and walls provide for confinement of oil spilled from the transformers and water discharged from fire protection sprinklers. The transformer structures also include the firewalls that separate the transformers from the Turbine Building.

The 230KV switchyard structures include the foundations and miscellaneous structural steel for the following:

1. Transmission Line (Towers) between the Main Transformers to the 230KV Switchyard,
2. Power Circuit Breakers (PCB),
3. Oil Reservoir and Cable Supports for the 230KV Low Pressure Oil-Filled cables,
4. Switchyard Bus,
5. Disconnect Switches,
6. Isolators, and
7. Connectors and Insulators.

In addition, the 230KV structures include the concrete cable trenches in the switchyard from the Switchyard Relay Building to the PCBs and the underground conduit from the trenches to the PCB electrical panels, and the electrical manholes.

The Transformer and Switchyard Structures include the concrete trenches containing the 230KV Low Pressure Oil-Filled cable from the Start-up Transformers to the 230KV Switchyard. A portion of these trenches is shown on FSAR Figure 1.2.2-2 extending from the vicinity of the transformers, under the Security Building, towards the Switchyard. The concrete trenches and covers are pre-cast or cast in place.

Based on the results of the HNP scoping and screening review, the Transformer and Switchyard Structures perform the following intended functions:

C-4	Fire Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Transformer and Switchyard Structures are in the scope of License Renewal because they contain:

1. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

2. SCs that are relied on during postulated fires and station blackout events.

FSAR and Drawing References

The Transformer and Switchyard Structures are described in Sections 8.1 and 8.2 of the HNP FSAR. The locations of the Transformer Structures and Switchyard are shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Transformer and Switchyard Structures components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-25: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Transformer and Switchyard Structures.

TABLE 2.4.2-24 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TRANSFORMER AND SWITCHYARD STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Below Grade	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Phase Bus Enclosure Assemblies	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-24 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TRANSFORMER AND SWITCHYARD STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.25 Turbine Building

Description

The Turbine Building is approximately 400 ft. long, 166 ft. wide, and 74 ft. high from the top of the foundation mat. Below elevation 261 ft., the structure is of reinforced concrete slabs and wall construction. Above elevation 261 ft. the building is constructed of steel and concrete slab on steel frame and metal decking, and has no walls or roof. The reinforced concrete turbine pedestal is the dominant structural feature of the building. The reinforced concrete mat and walls of the Turbine Building, approximately between Column Line 42 and 43, are designed and constructed to seismic Category I requirements, owing to the presence of the Diesel Generator Service Water Pipe Tunnel and Class I electrical cable area above the pipe tunnel. This area is designed and constructed to withstand the collapse of the Turbine Building concurrent with a safe shutdown earthquake. The Turbine Building supports and shelters many systems and components including Feedwater and Main Steam System components, condensate polishing demineralizer components, main condensers, main turbine, turbine-generator, electrical switchgear, electrical bus, and a gantry crane.

The Turbine Deck Metal Storage Building is located on the 314 ft. elevation of the Turbine Building and is used for storage of equipment and supplies. There are no permanent plant mechanical or electrical components associated with the building, and it does not perform any license renewal intended function and is therefore not within the scope of License Renewal.

The Turbine Generator Maintenance Canopy, also located on the 314 ft. elevation, is used for covering the Turbine Generator during maintenance. During plant operation, it is stored at the north end of the turbine deck away from plant equipment. This structure does not perform any license renewal intended function and is therefore not within the scope of License Renewal.

The Turbine Building Health Physics Room is located on the ground level and is a pre-engineered metal sided building. Components in this structure have an augmented quality classification. Therefore, this structure housed within the Turbine Building conservatively meets the License Renewal scoping criteria defined in 10CFR 54.4(a)(2).

There are sufficient gaps between the Turbine Building and the adjacent seismic Category I Reactor Auxiliary Building to preclude any interaction by one on the other during a seismic event. The Turbine Building is designed to prevent failure or collapse which would impair the ability of the Category I structures or systems to perform their intended design functions.

The Turbine Building includes a 215-ton gantry crane with a 50-ton auxiliary hoist. The gantry crane with auxiliary is classified as non-safety related, augmented quality equipment; however, it is not in scope for License Renewal.

Based on the results of the HNP scoping and screening review, the Turbine Building performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-11	Pipe Whip Restraint / HELB Shielding
C-13	Direct Flow
C-14	Shielding

The Turbine Building is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events.

FSAR and Drawing References

A general layout of the Turbine Building is shown on HNP FSAR figures beginning with Figure 1.2.2-60. The location of the Turbine Building is shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Turbine Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-26: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Turbine Building.

TABLE 2.4.2-25 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Battery Rack	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-13 Direct Flow C-14 Shielding

TABLE 2.4.2-25 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TURBINE BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Rated Doors	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Floor Drains	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Non-Fire Doors	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Phase Bus Enclosure Assemblies	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-11 Pipe Whip Restraint/HELB Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.26 Tank Area/Building

Description

The Tank Area/Building structures include the Unit 1 and Unit 2 Tank Area/Buildings. The Unit 1 Tank Area/Building is located adjacent to and south of the RAB-1 and east of the Waste Processing Building. It is a reinforced concrete seismic Category I structure, approximately 142 ft. long by 63 ft. wide, and 83 ft. high. The top of the roof, which provides for missile protection, is at approximately elevation 319 ft. The foundation mat is 8 ft. thick and is founded on suitable rock, and is located 24 ft. below the finished grade elevation of 260 ft. The Unit 1Tank Area/Building has cast-in-place reinforced concrete exterior walls, interior shear walls, and reinforced concrete floors, supported on shear walls, beams, and columns. Interior shielding or partition walls, other than shear walls, are either reinforced concrete or concrete block walls and are not load bearing. The exterior walls are waterproofed on the backfill face from the top of the mat to one foot below grade level; the waterproofing membrane terminates in reglets. All construction joints in exterior walls in contact with backfill have water stops.

The Unit 1Tank Area/Building houses the Refueling Water Storage Tank, Reactor Make-Up Water Storage Tank, Condensate Storage Tank, and other associated equipment. The Unit 1Tank Area/Building also houses the Waste Monitoring Tanks, Secondary Waste Sampling Tank, their associated pumps, and other facilities. The Condensate Storage Tank is protected against tornado missiles by concrete walls and roof.

The Unit 2 Tank Area/Building is located north of RAB-2. The Unit 2 Tank Area/Building has been constructed only to elevation 261 ft. to protect and house the ESW piping that passes through it. Seismic analysis of the as-built Unit 2 Tank Area/Building has been performed to obtain seismic response spectra for the as-built structure to verify the design of safety related piping and systems within the building.

The Tank Area/Building structures are separated from other buildings by sufficient gaps to preclude any interaction by one another due to seismic events. There are no adjacent non-seismic Category I buildings which would impair the integrity of the seismic Category I Tank Area/Building structures or components.

Based on the results of the HNP scoping and screening review, the Tank Area/Building structures perform the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-3	Shelter, Protection
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-14	Shielding

The Tank Area/Building is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions,

3. SCs that are relied on during postulated fires and station blackout events, and

4. Components that are part of the Environmental Qualification Program.

FSAR and Drawing References

The Tank Area/Building is described in FSAR Sections 3.8.4.1.6 and 3.8.4.9. A general layout of the Tank Area/Building is shown on Figures 1.2.2-84 and 3.8.4-21 of the HNP FSAR. The locations of the Tank Area/Building structures are shown on Figure 2.2-1. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Tank Area/Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-27: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Tank Area/Building.

TABLE 2.4.2-26 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TANK/AREA BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-26 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: TANK/AREA BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-4 Fire Barrier C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Rated Doors	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane/Build-Up	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for ASME Class 1, 2, 3 Piping & Components	C-2 Structural Support for Criterion (a)(1) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.27 Waste Processing Building

Description

The Waste Processing Building (WPB) is a reinforced concrete, seismic Category I structure, with cast-in-place reinforced concrete exterior walls and interior shear walls. Interior shielding or partition walls, other than shear walls, are either reinforced concrete or concrete block, and are not load bearing. The WPB is 289 ft. long, 191 ft. wide, and 110 ft. high. Reinforced concrete floors are at elevation 236 ft., 261 ft., 276 ft., 291 ft., and the roof at 321 ft. The building is supported on a 10 ft. thick reinforced concrete foundation mat, which in turn is founded on suitable rock. The exterior walls below grade are waterproofed on the backfilled faces. Construction joints in exterior walls in contact with backfill except for a portion of the northwest corner of the building are waterproofed with water stops.

The northwest portion of the WPB, which was previously isolated by RAB-4 and Tank Area/Building 4, is now subject to plant grade fill. The stability of the building for additional lateral earth pressure and hydrostatic pressure has been reviewed to confirm that it satisfies the design criteria. All openings in the WPB against the plant grade fill have been closed by concrete plugs for the full thickness of the walls.

The WPB houses the Liquid Waste Processing System, the Gaseous Waste Processing System, and the Solid Waste Processing System together with laboratories and personnel facilities.

The WPB has no safety related mechanical or electrical components located inside the building which need to be supported or protected. However, the WPB is a safety related structure and performs several intended functions including providing shelter and support for equipment within the scope of License Renewal. The WPB provides barriers to fire, flooding, water spray, high energy fluid release and potential missile barriers.

Based on the results of the HNP scoping and screening review, the WPB performs the following intended functions:

C-2	Structural Support for Criterion (a)(1) components
C-4	Fire Barrier
C-6	Missile Barrier
C-7	Structural Support for Criterion (a)(2) and (a)(3) components
C-13	Direct Flow
C-14	Shielding

The WPB is in the scope of License Renewal because it contains:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events,

2. SCs which are non-safety related whose failure could prevent satisfactory accomplishment of the safety related functions, and

3. SCs that are relied on during postulated fires.

FSAR and Drawing References

The WPB is described in FSAR Sections 3.8.4.1.4 and 3.8.4.9. A general layout of the Waste Processing Building is shown on FSAR Figures 1.2.2-47 through 1.2.2-54 and Figures 3.8.4-15 through 3.8.4-19. Figure 2.2-1 shows the location of the WPB. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the WPB components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-28: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Waste Processing Building.

TABLE 2.4.2-27 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE PROCESSING BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-27 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: WASTE PROCESSING BUILDING

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-13 Direct Flow C-14 Shielding
Concrete: Roof Slab	C-2 Structural Support for Criterion (a)(1) components C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Damper Mountings	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Barrier Penetration Seals	C-4 Fire Barrier
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Rated Doors	C-4 Fire Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Masonry Walls	C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Non-Fire Doors	C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components C-14 Shielding
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Roof-Membrane / Built-up	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seismic Joint Filler	C-4 Fire Barrier
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

2.4.2.28 Yard Structures

Description

Civil structures and structural components within the scope of License Renewal located in the Yard were identified by reviewing the HNP FSAR, drawings, equipment database and the results of on-site walkdowns. This resulted in a list of structures that were evaluated for License Renewal as either a Yard Structure or a Miscellaneous Structure. The Miscellaneous Structures were determined to be those structures with no License Renewal intended functions; whereas, the Yard Structures were determined to have License Renewal intended functions. Yard Structures include:

1. Underground Electrical Duct Banks, Protective Mats, and Manholes
2. Yard Lighting Poles, Electrical Duct Banks, and Manholes
3. The Oil Separator Area,
4. The Diesel Fuel Unloading Area,
5. Fire Hose Cabinet Support Structures,
6. NSW Gate Structure,
7. NSW Concrete Pipe,
8. CT Blowdown System Weir Structure,
9. CWS Concrete Pipe, and
10. CWS Discharge Block.

1. Underground Electrical Duct Banks, Protective Mats, and Manholes

The underground electrical conduits in the Seismic Category I duct banks in the yard are buried in trenches excavated in the ground below grade. The trenches are backfilled with suitable material to maintain the integrity of the electrical conduits during earthquakes and to provide protection from tornado missiles. The underground electrical conduits include the diesel generator main leads, which connect the Diesel Generator and Turbine Buildings, and the Seismic cable run from the ESW & CT Makeup Intake Structure to the Unit 1 Tank Area/Building. The electrical duct runs are protected against tornado missiles either by burial a sufficient distance below grade or by covering the backfill with reinforced concrete slabs. Reinforced concrete cover slabs are provided at all road and railroad crossings and are considered as missile barriers. The ends of electrical duct runs are isolated from the structures and are free to move in any direction. The ends are connected to steel sleeves by elastic boots and stainless steel straps or flexible conduit with threaded fittings. Seismic Category I manholes are provided in the plant area for routing of underground Seismic Category I electrical power and control cables. The manholes are reinforced concrete cubicles laid out individually or in multiple units and are buried in the ground; the top is six inches above grade elevation in unpaved areas and flush with the paving in paved areas. A sump pit is provided in each manhole cubicle to facilitate checking the presence of leakage in the manhole. The manholes and manhole covers are designed to resist seismic, tornado, and tornado missile loads. The manholes are founded entirely on either rock, existing soil, or compacted random fill. To permit differential movement between manholes and electrical cables, the cables are not anchored within the manholes. The openings provided in the side walls of the manhole for the cables are covered with steel plates; the steel plates have oversized holes for free movement of electrical conduits.

2. Yard Lighting Poles, Duct Banks, and Manholes

Two yard lighting poles are in scope for License Renewal. The poles provide area lighting for personnel to traverse from the north end of the Turbine Building to the Diesel Generator Building to take actions required for post-fire safe shutdown. The necessary yard structures include the poles, foundations, and associated underground electrical duct banks and manholes in the route between the Security Building and the poles. These structural components are in scope of License Renewal for the fire protection function. In addition, the manholes and electrical duct banks associated with: (1) the motor driven fire pumps, (2) the sump pump at the Diesel Fuel Unloading Area, and (3) the NSW pumps are in scope because they shelter and support electrical cables that provide a fire protection function.

3. Oil Separator Area

The Oil Separator Area provides a concrete basin with a concrete curb for separating oil from water. The water is normally discharged into the waste neutralization basin. The associated equipment is located on the concrete slab. The overall dimensions of the area are approximately 35 ft. by 40 ft. The area is located southwest of the WPB within the protected area. The Oil Separator Area provides a License Renewal fire protection function.

4. Diesel Fuel Unloading Area

This area provides for unloading diesel fuel from rail tank cars. The area consists of a metal-siding structure with a metal roof constructed on eight foundations. The structure is constructed over the railroad track just north of the FHB. Unloading pumps are located on a concrete slab with a concrete curb around the perimeter to retain any spillage. Spilled oil is directed into a sump for removal to the oil separator. The civil components used for collecting the oil spillage are in scope of License Renewal for the fire protection function.

5. Fire Hose Cabinet Support Structures

These structures provide a concrete slab supporting a cabinet that houses fire hoses. These structures are provided in various locations throughout the yard area. These civil components are in scope for the fire protection function.

6. Normal Service Water (NSW) Gate Structure

This structure provides a reinforced concrete enclosure for a sluice gate. The structure is located between the two reinforced concrete reducers that direct service water to flow into the NSW Structure. The NSW Gate Structure is relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

7. NSW Concrete Pipe Structure

The NSW concrete pipe connect the CT Basin at an Intake Box to the NSW Intake Structure. This structure includes the 6 ft. diameter reinforced concrete pipe, 10 ft. by 6 ft. reinforced concrete pipe reducers, and a 6 ft. by 6 ft. by 4 ft.-thick concrete pipe plug. The NSW Concrete Pipe Structure provides a flow path for service water from the CT Basin to the NSW Intake Structure. The NSW Concrete Pipe Structure is relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

8. CT Blowdown System Weir Structure

The CT Blowdown System Weir Structure is connected to the CT Basin and maintains the water level in the CT Basin for use by the NSW System. Under certain conditions, the water in the CT Basin is used by the NSW System to perform a fire protection function. Therefore, the CT Blowdown System Weir Structure is relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

9. CW System Concrete Pipe Structure

This structure consists of the two 10 ft. diameter reinforced concrete pipes that return CWS flow from the TB to the CWS Discharge Block located at the CT Basin. These pipes direct NSW System return flow to the CT Basin along with the CWS return flow. The structure includes the 2 ft. 6 in. diameter manhole reinforced concrete pipe and pressure cover. This structure also includes the thrust blocks that restrain the CWS Concrete Pipe Structure by supporting the outside of the pipes at pipe turns. The CW System Concrete Pipe Structure is relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

10. <u>CWS Discharge Block Structure</u>

This concrete structure combines the CWS return flow from the CW System Concrete Pipe Structure into a 13 ft. diameter concrete pipe which connects with the distribution header pipe in the CT Basin. The structure dimensions are approximately 25 ft. wide by 26 ft. high by 64 ft. long. The CWS Discharge Block Structure also returns NSW System flow to the CT Basin along with the CWS flow from the TB. Therefore, the CWS Discharge Block Structure is relied on in plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection. The NSW System is credited for fire protection following postulated fires when the ESW System is unavailable.

With the exception of the Class I duct banks, manholes, and protective mats, the Yard Structures listed above are not Class I or seismic Category I structures and support no safety related functions. The collapse of any of the non-seismic Category I structures listed above will not impair the integrity of adjacent seismic Category I structures or components due to sufficient distance between structures.

Based on the results of the HNP scoping and screening review, the Yard Structures perform the following intended functions:

Yard Structure	Intended Function	
1. Underground Electrical Duct Banks and Manholes	C-2	Structural Support for Criterion (a)(1) components
	C-3	Shelter, Protection
	C-6	Missile Barrier
2. Yard Lighting Poles, Duct Banks, and Manholes	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
3. Oil Separator Area	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
4. Diesel Fuel Unloading Area	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
5. Fire Hose Cabinet Support Structures	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
6. NSW Gate Structure	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
7. NSW Concrete Pipe	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
8. CT Blowdown System Weir Structure	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
9. CWS Concrete Pipe	C-7	Structural Support for Criterion (a)(2) and (a)(3) components
10. CWS Discharge Block	C-7	Structural Support for Criterion (a)(2) and (a)(3) components

The Yard Structures are in the scope of License Renewal because they contain:

1. SCs that are safety related and are relied upon to remain functional during and following design basis events, and

2. SCs that are relied on during postulated fires.

FSAR and Drawing References

The seismic Category I Underground Electrical Duct Runs are described in HNP FSAR Section 3.8.4.1.11. A general layout of seismic Category I Underground Electrical Duct Runs, Protective Mats, and a typical detail for manholes are shown on Figures 3.8.4-23 and 3.8.4-24. The Yard Lighting Structures, the Oil Separator Area, the Diesel Fuel Unloading Area are shown on Figure 2.2-1. The Fire Hose Cabinet support structures are located throughout the Yard; no sketch is provided. (The official FSAR has been submitted separately as paper copy; electronic FSAR files are provided for information only.)

Components Subject to Aging Management Review

The table below identifies the Containment Building components and commodities requiring aging management review (AMR) and their intended functions. The AMR results for these components/commodities are provided in Table 3.5.2-29: Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Yard Structures.

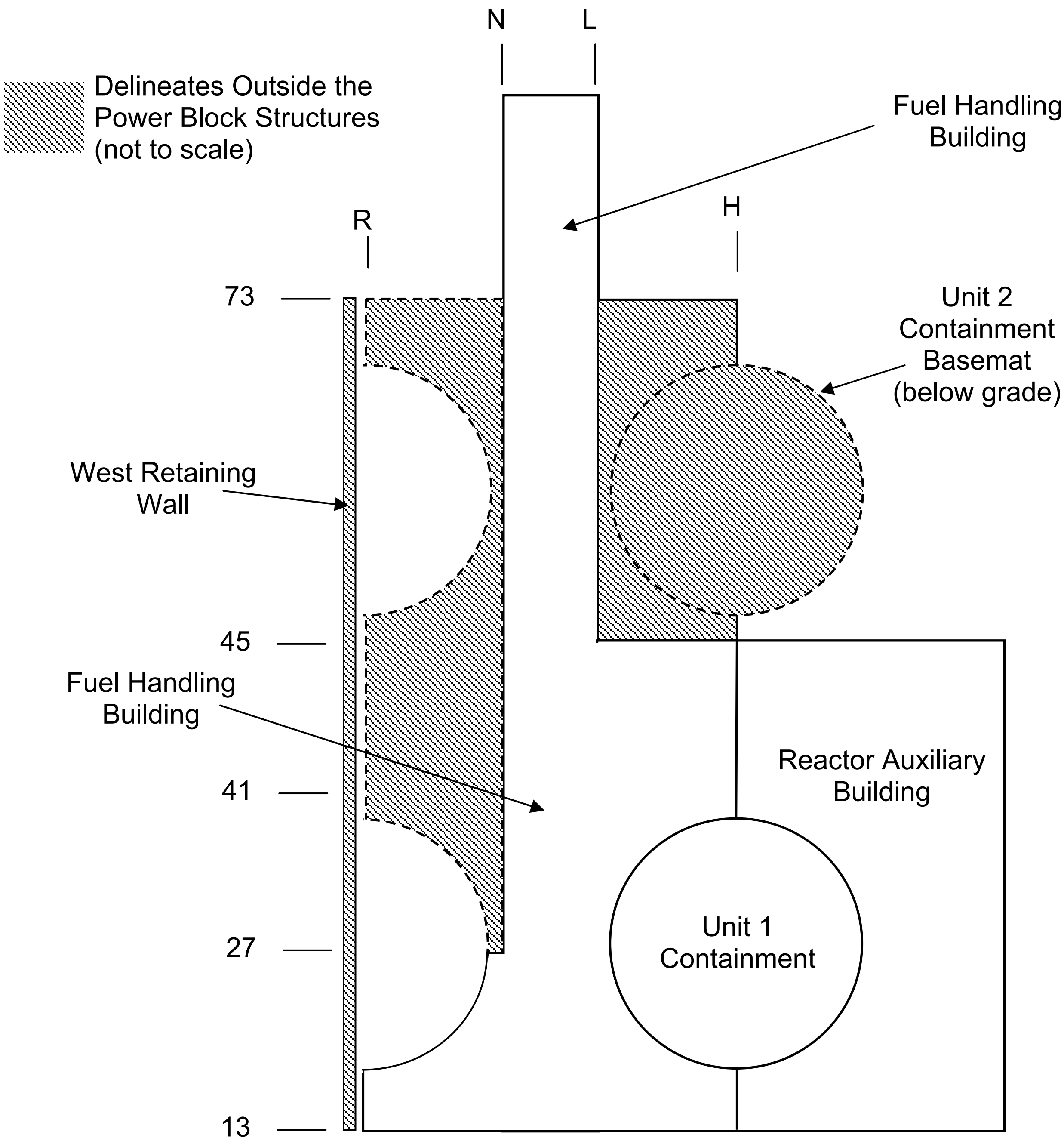
TABLE 2.4.2-28 COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: YARD STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Anchorage / Embedments	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Exterior Above Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components

TABLE 2.4.2-28 (continued) COMPONENT COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: YARD STRUCTURES

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Concrete: Exterior Below Grade	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-6 Missile Barrier C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Foundation	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Concrete: Interior	C-2 Structural Support for Criterion (a)(1) components C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Fire Hose Stations	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Lighting Poles	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Pipe	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 Structural Support for Criterion (a)(1) components C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Seals and Gaskets	C-3 Shelter, Protection C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Siding	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Steel Components: All structural steel	C-7 Structural Support for Criterion (a)(2) and (a)(3) components
Supports for Non-ASME Piping & Components	C-7 Structural Support for Criterion (a)(2) and (a)(3) components

FIGURE 2.4-1 OUTSIDE THE POWER BLOCK STRUCTURES



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2.5 SCOPING AND SCREENING RESULTS – ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) SYSTEMS

The determination of electrical/I&C systems within the scope of License Renewal is made through the application of the process described in Section 2.1.1. The results of the electrical/I&C systems scoping review are contained in Section 2.2. Section 2.1.2 provides the screening methodology for determining the components within the scope of 10 CFR 54.4 that meet the requirements contained in 10 CFR 54.21(a)(1). The components that meet these screening requirements are identified in this section. These identified components consequently require an aging management review (AMR) for License Renewal.

The methodology used to identify electrical/I&C components requiring an AMR is discussed in Subsection 2.1.2.3. The screening for electrical/ I&C components was performed on a generic component (commodity group) basis for the in-scope electrical/I&C systems listed in Table 2.2-3, as well as the electrical/I&C component types associated with in-scope mechanical systems and civil structures listed in Tables 2.2-1 and 2.2-2.

2.5.1 ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

The screening process for electrical/I&C components involves using plant documentation to identify the different types of electrical equipment and components located in the systems that are within the scope of License Renewal. Electrical/I&C component types were identified from a review of plant documents, controlled drawings, the EDB, and information from previous License Renewal applications. The electrical/I&C component commodity groups identified at HNP are listed in the table below. This list includes all electrical and I&C component commodity groups listed in Table 2.1-5 of NUREG-1800. The term "phase bus" from Table 2.1-5 has been changed to "metal enclosed bus" to conform to the terminology in Section 3.6 of NUREG-1800.

ELECTRICAL/I&C COMPONENT COMMODITY GROUPS INSTALLED IN IN-SCOPE SYSTEMS AND STRUCTURES AT HNP			
Alarm Units	Electrical portions of Electrical/I&C Penetration Assemblies	Light Bulbs	Solenoid Operators
Analyzers		Load Centers	Signal Conditioners
		Loop Controllers	Solid-State Devices
Annunciators	Elements	Meters	Splices
Batteries	Fuses	Motor Control Centers	Surge Arrestors
Metal enclosed bus	Generators	Motors	Switches
Chargers	Heat Tracing	Power Distribution Panels	Switchgear
Circuit Breakers	Heaters	Power Supplies	Switchyard Bus
Converters	High-voltage Insulators	Radiation Monitors	Terminal Blocks
Communication Equipment	Indicators	Recorders	Thermocouples
	Cables and Connections	Regulators	Transducers
Electrical Controls and Panel Internal Component Assemblies		Relays	Transformers
	Inverters	RTDs	Transmitters
	Isolators	Sensors	Transmission Conductors

2.5.2 APPLICATION OF SCREENING CRITERION 10 CFR 54.21(a)(1)(i) TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

Following the identification of the electrical/I&C component commodity groups, the criteria of 10 CFR 54.21(a)(1)(i) were applied to identify component commodity groups that perform their intended functions without moving parts or without a change in configuration or properties.

The following electrical/I&C component commodity groups were determined to meet the screening criteria of 10 CFR 54.21(a)(1)(i).

1. Cables and Connections (including splices, connectors, fuse holders, and terminal blocks).

2. Electrical portions of Electrical/I&C Penetration Assemblies.

3. Metal Enclosed Bus.

4. High-Voltage Insulators.

5. Switchyard Bus.

6. Transmission Conductors.

7. Lightning Rods.

8. Uninsulated Ground Conductors. (Uninsulated ground conductors are part of the cables and connections commodity group. However, they are evaluated separately since they contain no organic insulating materials.)

2.5.3 APPLICATION OF SCREENING CRITERION 10 CFR 54.21(a)(1)(ii) TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

The 10 CFR 54.21(a)(1)(ii) screening criterion was applied to the specific component commodity groups that remained following application of the 10 CFR 54.21(a)(1)(i) criterion. 10 CFR 54.21(a)(1)(ii) allows the exclusion of those component commodity groups that are subject to replacement based on a qualified life or specified time period. The only electrical/I&C components identified for exclusion by the criteria of §54.21(a)(1)(ii) are electrical components included in the HNP Environmental Qualification (EQ) Program. This is because electrical components included in the HNP EQ Program have defined qualified lives and are replaced prior to the expiration of their qualified lives. No electrical/I&C components within the HNP EQ Program are subject to AMR in accordance with the screening criteria of §54.21(a)(1)(ii). The Electrical/I&C Penetration Assemblies at HNP are included in the HNP EQ Program. Therefore, the electrical portions of Electrical/I&C Penetration Assemblies have been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), and they are not subject to AMR.

2.5.4 DETAILED SCREENING RESULTS

2.5.4.1 Non-EQ Insulated Cables and Connections

An insulated cable is an assembly of an electrical conductor (e.g., wire) with an insulation covering or a combination of conductors insulated from one another with overall coverings. Connections or terminations are used to connect the cable conductors to other cables or electrical devices. Connections include connectors, splices, and terminal blocks. Fuse holders are considered to be a type of electrical connection similar to a terminal block.

Insulated cables and connections inside the enclosure of an active device (e.g., motor leads and connections, and cables and connections internal to relays, chargers, switchgear, transformers, power supplies, etc.) are maintained along with the other subcomponents and piece-parts inside the enclosure and are not included in the Non-EQ Insulated Cables and Connections commodity group.

Because of the complexity of determining whether individual insulated cables support a license renewal intended function, all non-EQ insulated cable and connections were conservatively screened as subject to AMR. However, individual circuits were subject to elimination from scope on a case-by-case basis during the AMR evaluation process based on a more detailed evaluation of their intended functions.

A review of HNP fuse holders was performed using criteria specified in NUREG-1800 to identify fuse holders that require AMR. The review eliminated fuse holders that were part of a larger (active) assembly; the remaining fuse holders are subject to AMR.

2.5.4.2 Electrical Portions of Electrical/I&C Penetration Assemblies

As noted in Subsection 2.5.3 above, the Electrical/I&C Penetration Assemblies are included in the HNP EQ Program. The electrical portions of Electrical/I&C Penetration Assemblies have been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), because they are included in the HNP EQ Program. Therefore, they are not subject to AMR.

2.5.4.3 Metal Enclosed Bus and Connections

Metal Enclosed Bus and associated connections are used to connect two or more elements (i.e., electrical equipment such as switchgear and transformers) of an electrical circuit. The Metal Enclosed Bus and Connections commodity group includes iso-phase bus, and non-segregated 6.9 kilovolt (KV) and 480 Volt (V) phase bus. Iso-phase bus is electrical bus in which each phase conductor is enclosed by an individual metal housing separated from adjacent conductor housings by an air space. Non-segregated bus is electrical bus constructed with all phase conductors in a common enclosure without barriers (only air space) between the phases. Bus and bus connections inside a generator, transformer or switchgear enclosure are inspected and maintained along with other subcomponents and piece-parts inside the enclosure and are not included in this review. Metal Enclosed Bus housings and associated structural supports are addressed in Section 2.4 as civil/structural commodities.

The Metal Enclosed Bus and Connections that are within the scope of License Renewal are provided in the following table.

Type	Description
Iso-phase	Connects main transformers and Unit Auxiliary Transformers (UATs)
Non-segregated, 6.9KV	Connects Startup Transformer (SUT)-1A to Auxiliary Bus 1D
Non-segregated, 6.9KV	Connects SUT-1B to Auxiliary Bus 1E
Non-segregated, 6.9KV	Connects UAT-1A to Auxiliary Bus 1D
Non-segregated, 6.9KV	Connects UAT-1B to Auxiliary Bus 1E
Non-segregated, 6.9KV	Connects SUT-1A to Auxiliary Bus 1A
Non-segregated, 6.9KV	Connects SUT-1B to Auxiliary Bus 1B
Non-segregated, 6.9KV	Connects UAT-1A to Auxiliary Bus 1A
Non-segregated, 6.9KV	Connects UAT-1B to Auxiliary Bus 1B
Non-segregated, 6.9KV	Connects Auxiliary Bus 1D to Emergency Bus 1A-SA
Non-segregated, 6.9KV	Connects Auxiliary Bus 1E to Emergency Bus 1B-SB
Non-segregated, 6.9KV	Connects Auxiliary Bus 1A to Auxiliary Bus 1C
Non-segregated, 6.9KV	Connects Auxiliary Bus 1B to Auxiliary Bus 1C
Non-segregated, 480V	Crosstie connecting Auxiliary Bus 1D1 to Auxiliary Bus 1E1
Non-segregated, 480V	Crosstie connecting Auxiliary Bus 1D2 to Auxiliary Bus 1E2

2.5.4.4 High-Voltage Insulators

High-voltage insulators are provided on the circuits used to supply power from the switchyard to plant buses during recovery from an SBO. The function of high-voltage insulators is to insulate and support electrical conductors. High-voltage insulators are passive, long-lived components. Therefore, high-voltage insulators meet the criteria of 10 CFR 54.21(a)(1)(ii) and are subject to an AMR. The insulators are those used to support and insulate uninsulated, high-voltage electrical components, such as, transmission conductors and bus. The in-scope high-voltage insulators are located in the power path from the 230KV Switchyard to the 230KV Transformer Yard.

2.5.4.5 Switchyard Bus and Connections

Switchyard bus provides a portion of the circuits supplying power from the switchyard to plant buses during recovery from an SBO. The function of switchyard bus is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals. The switchyard bus is a passive, long-lived component. Therefore, switchyard bus meets the criteria of 10 CFR 54.21(a)(1)(ii) and is subject to an AMR. Switchyard bus is uninsulated, unenclosed, rigid electrical conductor used to electrically connect various elements in the switchyard such as disconnect switches and flexible transmission conductors. This scope of review of switchyard bus includes the switchyard bus and the hardware used to secure the bus to the station post insulators that support the bus. Switchyard bus connections to a disconnect switch are inspected and maintained along with the disconnect switch and, therefore, are not included in the AMR.

2.5.4.6 Transmission Conductors and Connections

Transmission conductors provide a portion of the circuits used to supply power from the switchyard to plant buses during recovery from an SBO. The function of transmission conductors is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals. Transmission conductors are passive, long-lived components. Therefore, transmission conductors meet the criteria of 10 CFR 54.21(a)(1)(ii) and are subject to an AMR.

Transmission conductors are uninsulated, stranded electrical cables used to electrically connect various elements in the switchyard, such as power circuit breakers, transformers and rigid switchyard bus. The transmission conductors are insulated from their support structures by strain or suspension insulators. The transmission conductors are secured to the insulators with specifically designed metal hardware. The review of transmission conductors includes the transmission conductors and the hardware used to secure the conductors to the high-voltage insulators and electrically connect the conductors to the switchyard bus and the main power transformers.

2.5.4.7 Lightning Rods

Refer to the discussion of Uninsulated Ground Conductors and Connections in the following subsection. Because of the similarity of materials of construction, the in-scope, passive, long-lived elements of the Lightning Protection System and the Site Grounding System have been combined into the Uninsulated Ground Conductor and Connections commodity group.

2.5.4.8 Uninsulated Ground Conductors and Connections

Uninsulated ground conductors are used in a lightning protection application to protect structures and equipment from lightning strikes by providing a low resistance path to ground. Uninsulated ground conductors consist of air terminals, ground rods, stranded uninsulated (bare) electrical cable, and connections. Connections are commonly made with welds or mechanical type connectors, which include compression, bolted, and wedge-type devices. The function of uninsulated ground conductors is to provide electrical connection to specified sections of an electrical circuit to deliver current to ground. The Lightning Protection and Site Grounding Systems are part of this commodity group and are credited for compliance with a fire protection function related to lightning protection. The uninsulated ground conductors commodity consists of passive, long-lived components. Therefore, it meets the criteria of 10 CFR 54.21(a)(1)(ii) and is subject to an AMR.

2.5.5 ELECTRICAL/I&C COMPONENTS REQUIRING AN AGING MANAGEMENT REVIEW

The table below identifies the Electrical/I&C component commodity groups requiring an AMR and their intended functions. The AMR results for these components/commodities are provided in Table 3.6.2-1: Electrical and I&C Systems - Summary of Aging Management Evaluation – Electrical and I&C Systems.

TABLE 2.5-1 COMPONENT/COMMODITY GROUPS REQUIRING AGING MANAGEMENT REVIEW AND THEIR INTENDED FUNCTIONS: ELECTRICAL AND I&C SYSTEMS

Component/Commodity	Intended Function(s) (See Table 2.0-1 for function definitions)
Non-EQ Insulated Cables and Connections [1]	E-1 Electrical Continuity
Metal Enclosed Bus and Connections	E-1 Electrical Continuity E-2 Electrical Insulation
High-Voltage Insulators	E-2 Electrical Insulation
Switchyard Bus and Connections	E-1 Electrical Continuity
Transmission Conductors and Connections	E-1 Electrical Continuity
Uninsulated Ground Conductors and Connections [2]	E-1 Electrical Continuity

Notes:

1. Connections include splices, connectors, terminal blocks, and fuse holders. Fuse holders are considered to be another type of electrical connection similar to a terminal block and are, therefore, subject to aging management review.

2. Uninsulated Ground Conductors used for lightning protection include air terminals (i.e., lightning rods), ground rods, ground cable, and connections.

3.0 AGING MANAGEMENT REVIEW RESULTS

For those structures and components that are identified as being subject to an aging management review, 10 CFR 54.21(a)(3) requires demonstration that the effects of aging will be adequately managed so that their intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

This chapter describes the results of the aging management reviews of the structures and components determined, during the scoping and screening processes, to be subject to an aging management review. Organization of this chapter is based on Tables 1 through 6 of Volume 1 of NUREG-1801, Generic Aging Lessons Learned (GALL), Revision 1, dated September 2005 (the GALL Report), and Chapter 3, "Aging Management Review Results," of NUREG-1800, Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants (SRP-LR), Revision 1, dated September 2005. The major sections of this Chapter are:

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.2 Aging Management of Engineered Safety Features

3.3 Aging Management of Auxiliary Systems

3.4 Aging Management of Steam and Power Conversion Systems

3.5 Aging Management of Containments, Structures, and Component Supports

3.6 Aging Management of Electrical and Instrumentation and Controls

Most of the aging management review (AMR) results information in Chapter 3.0 is presented in two tables of the following types:

Table 3.x.1 – where '3' indicates LRA Chapter 3.0; 'x' indicates the section number; and '1' indicates the first table type. For example, in the Reactor Vessel, Internals, and Reactor Coolant System section this table would be numbered 3.1.1 and in the Auxiliary Systems section, this table would be numbered 3.3.1. This table will typically be referred to as "Table 1."

Table 3.x.2-y – where '3' indicates LRA Chapter 3.0; 'x' indicates the section number; '2' indicates the second table type; and 'y' indicates the specific system being addressed. For example, within Section 3.1 for the Reactor Vessel, Internals, and Reactor Coolant System, the table number for the Reactor Vessel and Internals would be 3.1.2-1; and for the Incore Instrumentation System, 3.1.2-2. Also, within Section 3.2 for Engineered Safety Features, this table would be 3.2.2-1, for the Containment Spray System; and the next system would have a table numbered 3.2.2-2. This table will typically be referred to as "Table 2."

Table Descriptions

NUREG-1801, the GALL Report, contains the NRC staff's generic evaluation of 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 period of extended 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. The GALL Report also contains recommendations on the specific areas for which existing program 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 tables in this Chapter.

The purpose of Table 1 (refer to the Sample Table 1 below) is to provide a summary comparison of specific plant AMR details with the corresponding tables of NUREG-1801, Volume1. The table uses essentially the same format as Tables 1 through 6 of NUREG-1801, Volume 1, except that the "ID" and "Type" columns have been replaced by an "Item Number" column and the "Related Generic Item" and "Unique Item" columns have 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 "Further Evaluation Recommended" column is used in those cases where NUREG-1801 recommends further evaluation of a Table 1 Item. Separate text is included to provide these evaluations. The "Discussion" column provides clarifying or 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 text is located.
- The name of a plant-specific program being used.
- Exceptions to the GALL Report assumptions.
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may appear inconsistent.
- A discussion of how the item is different from 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 recommended in NUREG-1801).

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.

Sample Table 1

Table 3.x.1 Summary of Aging Management Evaluations in Chapter __of NUREG-1801 for ______

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.x.1-01					
3.x.1-02					
3.x.1-03					

Table 2 (refer to the Sample Table 2 below) provides the detailed results of the aging management reviews for those components/commodities identified in LRA Chapter 2.0 as being subject to aging management review. There will be a Table 2 for each of the systems within a Chapter 3.0 section. Table 2 consists of the following nine columns:

Component/Commodity – The first column identifies the components/commodities from Chapter 2.0 that are subject to aging management review. Typically, they are listed in alphabetical order, or in approximately the order presented in NUREG-1801. During the screening process, some structures and components (SCs) were incorporated into commodity groups based on similarity of their design or materials of construction. Use of commodity groups made it possible to address an entire group of SCs with a single evaluation. In the aging management reviews described in the following Sections, further definition of commodity groups was performed based on design, material, environmental, and functional characteristics in order to disposition an entire group with a single aging management review.

Where possible, plant components/commodities were assigned to groups that coincided with NUREG-1801 component/commodity groups in order to facilitate alignment of components with NUREG-1801.

Intended Function – The second column contains the license renewal intended functions (including abbreviations where applicable) for the listed component types. Definitions and abbreviations of intended functions are contained in Table 2.0-1.

Material – The third column lists the particular materials of construction for the component/commodity group.

Environment – The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated. The service environments used in the HNP aging management reviews are listed below in Table 3.0-1.

Aging Effect Requiring Management – As part of the aging management review process, aging effects requiring management are identified for material and environment combinations. These are listed in column five. The HNP aging management review methodology is based on generic industry guidance for determining aging effects for both mechanical and structural components based on the materials of construction and applicable environmental conditions. The material and environment-based rules in the industry guidance documents are derived from known age-related degradation mechanisms and industry operating experience. Although not a requirement, both aging effects and aging mechanisms are sometimes included on Table 2 to facilitate alignment with NUREG-1801.

Aging Management Programs – The aging management programs used to manage the aging effects requiring management are identified in column six of Table 2. Aging management programs are described in Appendix B.

NUREG-1801, Volume 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 consideration given to the standard notes, to identify consistencies. When they are identified, consistencies 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. Thus, 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. Therefore, 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 notes designated with letters are standard notes that will be the same from application to application throughout the industry. Any additional, plant-specific notes will be identified by a number. Plant-specific notes provide information or clarification regarding the aging management review of the Table 2 line item. The generic and plant-specific notes are listed at the end of Sections 3.1 through 3.6. Section 3.1 uses plant specific notes numbered in the 100-series (e.g., 101, 102, etc.). Section 3.2 uses plant-specific notes numbered in the 200-series; Section 3.3, in the 300-series; Section 3.4, in the 400-series; Section 3.5, in the 500-series; and Section 3.6, in the 600-series. Section 3.3 also uses notes in the 700-series, because it required more notes than were available in the 300-series alone.

Generic notes A through E indicate that a useful comparison may be made between the Table 2 line item and NUREG-1801. Therefore, items associated with notes A through E will also contain a NUREG-1801 Vol. 2 item and a reference to a Table 1 item.

Sample Table 2

Table 3.x.2-y Section 3 Title–Summary of Aging Management Evaluation–Plant Specific System

Component / Commodity	Intended Function	Material	Environ-ment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes

Table Usage

Each row in Table 1 is evaluated by the reviewer by moving from left to right across the table. No evaluation of information in the Component, Aging effect/Mechanism, Aging Management Program or Further Evaluation Recommended columns is required, as this information is taken directly from NUREG-1801, Volume 1. The Discussion column provides the information of most use to the reviewer and summarizes the information necessary to determine how the aging management review results align with NUREG-1801, Volume 1.

Table 2 provides all the aging management review information for the plant, irrespective of any comparisons to NUREG-1801. In a given row in the table, the reviewer can see the intended function, material, environment, aging effect requiring management, and aging management program combination for a component/commodity type within a system. In addition, a referenced item number in column seven will identify any correlation between the information in Table 2 and that in NUREG-1801, Volume 2. The reviewer can refer to the item number in NUREG-1801, Volume 2, if desired, to verify the correlation. If the column is blank, no correspondence to NUREG-1801, Volume 2 was identified. As the reviewer continues across the table from left to right in a row, the next column is labeled Table 1 Item. If there is a reference number to a corresponding row in Table 1, the reviewer can refer to Table 1 to determine how the aging management program for this combination aligns with NUREG-1801. Table 2 provides a reviewer with a means to navigate from the components subject to an aging management review in LRA Chapter 2.0 through the evaluation of aging management programs used to manage the effects of aging for the components/commodities.

TABLE 3.0-1 SERVICE ENVIRONMENTS

Service Environment [1]	Description
Air - Indoor	Indoor air includes heated, ventilated, air conditioned, or spaces sheltered/protected from weather. Reactor Auxiliary Building Temperature Range: -2°F to 122°F Relative Humidity Range 20% to 100% Turbine Building (Indoor Areas Only) Temperature Range: 60°F to 120°F Maximum Relative Humidity 100% Waste Processing Building Temperature Range: 60°F to 122°F Relative Humidity Range 20% to 90% Emergency Service Water Intake Structure Temperature Range: 51°F to 122°F Relative Humidity Range 10% to 100% Fuel Handling Building Temperature Range: 60°F to 115.5°F Relative Humidity Range 20% to 100% Diesel Generator Building and Security Building Temperature Range: 51°F to 122°F Relative Humidity Range 10% to 100% Diesel Fuel Oil Storage Tank Building Temperature Range 60°F to 122°F Maximum Relative Humidity 100% Tank Area (Indoor Areas Only) Maximum Temperature 122°F Relative Humidity Range 20% to 100% Emergency Service Water Screening Structure, Switchyard Relay Building, and other indoor areas Temperature Range: -2°F to 105°F Relative Humidity Range 10% to 100% For the purposes of AMR, Air - Indoor may represent the following NUREG-1801 terminology: Air Air - indoor Air - indoor and outdoor Air - indoor controlled (External) Air - indoor uncontrolled Air - indoor uncontrolled (External) Air - indoor uncontrolled (Internal) Air - indoor uncontrolled (Internal/External) Air - indoor uncontrolled >35°C (>95°F) (Internal) Air - indoor uncontrolled or air - outdoor Air with reactor coolant leakage Air with borated water leakage Any Various

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Air - Outdoor	Atmospheric air with a temperature range of -2°F to 105°F and a relative humidity range of 10% to 100%. This environment is subject to periodic wetting and wind. For the purposes of AMR, Air - Outdoor may represent the following NUREG-1801 terminology: Air - indoor and outdoor Air - indoor uncontrolled or air - outdoor Air - indoor uncontrolled or air outdoor Air - outdoor Air - outdoor (External) Any Various
Air/Gas (Dry)	Non-condensable vapor with a very limited percentage of moisture present. This environment includes air that has been treated to reduce the dewpoint well below the system operating temperature and commercial grade gases (such as nitrogen, freon, etc.) that are provided as a high quality product with little if any contaminants. For the purposes of AMR, Dry Air/Gas may represent the following NUREG-1801 terminology: Gas Air, Dry
Air/Gas (Wetted)	Air/Gas environments containing significant amounts of moisture where condensation or water pooling may occur. This environment includes air with enough moisture to facilitate loss of material in steel caused by general, pitting, and crevice corrosion. For the purposes of AMR, Air/Gas (Wetted) may represent the following NUREG-1801 terminology: Air - indoor uncontrolled (Internal) Condensation Condensation (Internal) Moist Air
Cable Oil	Cable oil is a highly refined, low viscosity pour-point petroleum oil specifically formulated for use as an impregnating and insulation medium in fluid filled "hollow core" type high-voltage energy transmission cables. Water contamination of cable oil is not assumed unless indicated by operating experience.
Concrete	An environment where components are embedded in concrete. This environment is considered aggressive when the concrete pH is <11.5 or chlorides concentration is >500 ppm. For the purposes of AMR, Concrete may represent the following NUREG-1801 terminology: Concrete

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Containment Air	Atmospheric air with a slightly negative pressure (-1/4" wg) and a normal temperature range from 80°F to 120°F. During outages the temperature may be as low as 50°F. The Containment is maintained below a bulk average temperature of 120°F. The area inside the primary shield wall is maintained at a temperature below 150°F. The relative humidity is in the range of 20% to 75% (45% average). For the purposes of AMR, Containment Air may represent the following NUREG-1801 terminology: Air - indoor uncontrolled Any Note: This environment is used for civil/structural AMRs. The mechanical discipline used the Air – Indoor environment for the AMR of SCs in containment.
Diesel Exhaust	This environment represents the exhaust from diesel engines. It is considered to have the potential to concentrate contaminants and be subject to wetting through condensation. For the purposes of AMR, Diesel Exhaust may represent the following NUREG-1801 terminology: Diesel Exhaust
Fuel Oil	Fuel oil for the Emergency Diesel Generators, Diesel-driven Fire Pump, and the Security Diesel Generator. Water contamination of fuel oil is assumed. For the purposes of AMR, Fuel Oil may represent the following NUREG-1801 terminology: Fuel oil (Water as a contaminant)
Hydraulic Fluid	Hydraulic Fluids include a triaryl phosphate hydraulic fluid specifically formulated for use in electro-hydraulic control systems. Water contamination of hydraulic fluid is not assumed unless indicated by operating experience.
Lubricating Oil	Lubricating oils are low to medium viscosity hydrocarbons used for bearing, gear, and engine lubrication. Water contamination of lubricating oil is assumed. For the purposes of AMR, Lubricating Oil may represent the following NUREG-1801 terminology: Lubricating oil
Ohmic Heating	Internal heat generated by the resistance of a conductor as current passes through it.

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

<table>
<tr><th>Service Environment [1]</th><th colspan="2">Description</th></tr>
<tr><td rowspan="14">Radiation (Normal Operational Exposure)</td><td colspan="2">This is an environment where components are exposed to total integrated dose due to normal operational exposure for 60 years from gamma and beta radiation.</td></tr>
<tr><td>Containment Building</td><td>3.02×10^{10} rads (Inside surface of the Primary Shield Wall - gamma only)
2.895×10^{7} rads (Inside Secondary Shield Wall)
1.32×10^{5} rads (Outside Secondary Shield Wall)</td></tr>
<tr><td>Reactor Auxiliary Building</td><td>1.5×10^{5} rads (except as noted below)</td></tr>
<tr><td>(Demineralizer Cubicles)</td><td>1.5×10^{8} rads</td></tr>
<tr><td>(Charging Pump Room)</td><td>2.79×10^{6} rads</td></tr>
<tr><td>(Letdown Heat Exchanger Rooms)</td><td>1.01×10^{6} rads</td></tr>
<tr><td>Fuel Handling Building</td><td>1.05×10^{4} rads (except as noted below)</td></tr>
<tr><td>(Demineralizer Compartments)</td><td>1.05×10^{8} rads</td></tr>
<tr><td>(Recycle Holdup Tank Area)</td><td>3.03×10^{7} rads</td></tr>
<tr><td>(Demineralizer Filter, Fuel Pool and Refueling Water Filter, and Skimmer Filter Compartments)</td><td>3.0×10^{5} rads</td></tr>
<tr><td>(Filter Backwash Pumps and Tank Compartments)</td><td>6.0×10^{4} rads</td></tr>
<tr><td>Tank Area
(RWST, RMWST, and CST)</td><td>1.35×10^{4} rads</td></tr>
<tr><td>Tank Area
(Waste Monitor Tanks)</td><td>1.35×10^{4} rads</td></tr>
<tr><td>All other areas</td><td>Negligible</td></tr>
<tr><td>Radiation (Neutron Fluence)</td><td colspan="2">This is an environment where there is the potential for exposure to neutron radiation.

The maximum neutron fluence on the inside surface of the reactor pressure vessel is 6.80×10^{19} n/cm^2 (E > 1 MeV) for 60 years.

The maximum neutron fluence on the outside surface of the reactor pressure vessel is 4.24×10^{18} n/cm^2 (E > 1 MeV) for 60 years.

The maximum neutron fluence on the inside surface of the primary shield wall is 2.89×10^{18} n/cm^2 (E > 1 MeV) for 60 years.

The maximum neutron fluence on the outside surface of the primary shield wall is 1×10^{4} n/cm^2 (E > 1 MeV) for 60 years.</td></tr>
</table>

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Radiation (Ultraviolet)	This is an environment where there is the potential for exposure to electromagnetic energy with a lower frequency than that of gamma or X-rays. UV radiation sources include solar radiation and ultraviolet or fluorescent lamps.
Raw Water	Harris Lake provides the source of raw water utilized by HNP. Raw water is also rain or ground water. Raw water is water that has not been demineralized or chemically treated to any significant extent. For use in systems, the water has been rough filtered to remove large particles and may contain a biocide additive for control of micro- and macro-organisms. Raw water may contain contaminants including oil and boric acid depending on the location. Floor drains and reactor building and auxiliary building sumps may be exposed to a variety of untreated water that is thus classified as raw water for the determination of aging effects. For the purposes of AMR, Raw Water may represent the following NUREG-1801 terminology: Any Ground water Raw water Untreated water Untreated water or raw water Waste water (untreated or treated water) Water - flowing Water - standing Water - flowing under foundation Various
Silicone Fluid	A clear, mixed phenylmethyl dimethyl cyclosiloxane fluid. This environment is associated with sealed capillary tubing. Water contamination of silicone fluid is not assumed unless indicated by operating experience.
Soil	External environment for components buried in the soil, including ground water in the soil. This environment is "non-aggressive" as defined in NUREG-1801. For the purposes of AMR, Soil may represent the following NUREG-1801 terminology: Soil
Steam	Steam supply from the steam generators or heating and process steam produced from the boiler. For the purposes of AMR, Steam may represent the following NUREG-1801 terminology: Reactor coolant and secondary feedwater/steam Reactor coolant/steam Secondary feedwater/steam Steam

TABLE 3.0-1 (continued) SERVICE ENVIRONMENTS

Service Environment [1]	Description
Treated Water	Treated water is demineralized water or chemically purified water and is the base water for all clean systems. Depending on the system, treated water may require further processing. Treated water could be deaerated and include corrosion inhibitors, biocides, or some combination of these treatments. For the purposes of AMR, Treated Water may represent the following NUREG-1801 terminology: Closed cycle cooling water Reactor coolant Reactor coolant and neutron flux Reactor coolant and secondary feedwater/steam Reactor coolant/steam Secondary feedwater Secondary feedwater/steam Steam Treated borated water Treated water

NOTE: 1. The HNP Service Environments may be internal or external environments depending on the physical form and function of the component/commodity being considered. Whether an environment is internal or external is identified on the aging management review tables for the system under review.

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3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 INTRODUCTION

Section 3.1 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.3.1, Reactor Vessel, Internals, and Reactor Coolant System, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Reactor Vessel and Internals (Subsection 2.3.1.1)
2. Incore Instrumentation System (Subsection 2.3.1.2)
3. Reactor Coolant System (Subsection 2.3.1.3)
4. Reactor Coolant Pump and Motor (Subsection 2.3.1.4)
5. Pressurizer (Subsection 2.3.1.5)
6. Steam Generator (Subsection 2.3.1.6)

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 that are applicable to component/ commodity groups in this Section. Table 3.1.1 uses the format of Table 1 described in Section 3.0 above.

3.1.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. Subsequent OE will be reviewed and applicable OE will be updated, as required, with the amendment to the application required by 10 CFR 54.21(b). The OE review consisted of the following:

Site: HNP site-specific OE has been captured by a review of the Action Tracking database and, as appropriate, a review of the System Engineering Notebooks and System Health Reports and discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. Based on a review of plant-specific OE, loss of material due to wear was identified as an aging effect requiring management for neutron flux thimbles. This aging effect is also identified in NUREG-1801.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience subsequent to the date of the aging management review continues to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.1.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Reactor Vessel, Internals, and Reactor Coolant System area.

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Incore Instrumentation System

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant Pump and Motor

Table 3.1.2-5 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer

Table 3.1.2-6 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generator

These tables use the format of Table 2 described in Section 3.0 above.

3.1.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they 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.

3.1.2.1.1 Reactor Vessel and Internals

Materials

The materials of construction for the Reactor Vessel and Internals components are:

- Alloy Steel with Stainless Steel Cladding
- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- High Strength Carbon or Low Alloy Steel
- Nickel Base Alloys
- Stainless Steel

Environment

The Reactor Vessel and Internals components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Silicone Fluid
- Treated Water

Aging Effects Requiring Management

The following Reactor Vessel and Internals aging effects require management:

- Change in Dimensions
- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Vessel and Internals components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program
- One-Time Inspection Program
- Reactor Head Closure Studs Program
- Reactor Vessel Surveillance Program
- Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program
- Water Chemistry Program

3.1.2.1.2 Incore Instrumentation System

Materials

The materials of construction for the Incore Instrumentation System components are:

- Stainless Steel

Environment

The Incore Instrumentation System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Incore Instrumentation System aging effects require management:

- Cracking
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Incore Instrumentation System components:

- Flux Thimble Tube Inspection Program
- Water Chemistry Program

3.1.2.1.3 Reactor Coolant System

Materials

The materials of construction for the Reactor Coolant System components are:

- Cast Austenitic Stainless Steel
- Stainless Steel

Environment

The Reactor Coolant System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Reactor Coolant System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Coolant System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program
- Water Chemistry Program

3.1.2.1.4 Reactor Coolant Pump and Motor

Materials

The materials of construction for the Reactor Coolant Pump and Motor components are:

- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- Copper Alloy <15% Zn
- High Strength Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Reactor Coolant Pump and Motor components are exposed to the following:

- Air - Indoor
- Lubricating Oil or Hydraulic Fluid
- Treated Water

Aging Effects Requiring Management

The following Reactor Coolant Pump and Motor aging effects require management:

- Cracking
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Coolant Pump and Motor components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Water Chemistry Program

3.1.2.1.5 Pressurizer

Materials

The materials of construction for the Pressurizer components are:

- Alloy Steel with Stainless Steel Cladding
- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Cast Austenitic Stainless Steel
- Copper Alloy >15% Zn
- High Strength Carbon or Low Alloy Steel
- Nickel Base Alloys
- Stainless Steel

Environment

The Pressurizer components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Pressurizer aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Pressurizer components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.1.2.1.6 Steam Generator

Materials

The materials of construction for the Steam Generator components are:

- Alloy Steel with Stainless Steel Cladding
- Carbon or Low Alloy Steel
- Nickel Base Alloys
- Stainless Steel

Environment

The Steam Generator components are exposed to the following:

- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Steam Generator aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Steam Generator components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Steam Generator Tube Integrity Program
- Water Chemistry Program

3.1.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Reactor Vessel, Internals, and Reactor Coolant System, those activities are addressed in the following subsections.

3.1.2.2.1 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)(1). HNP License Renewal TLAA evaluations are addressed in Chapter 4; the evaluation of TLAAs associated with cumulative fatigue damage is addressed in Section 4.3.

NUREG-1800 and NUREG-1801 incorrectly identify item 3.1.1-01 as applicable only to BWR plants; however, unique items IV.A1-6 (BWR) and IV.A2-20 (PWR) apply.

The HNP reactor vessel does not have a support skirt and attachment welds. However, the Reactor Vessel Primary Nozzle Support Pads have been aligned to this item based on material, environment, aging effect, and program.

3.1.2.2.2 Loss of Material Due to General, Crevice, and Pitting Corrosion

3.1.2.2.2.1 PWR Steam Generator Shell and BWR Reactor Vessel Components Exposed to Treated Water and Steam

Loss of material for BWR reactor vessel components is applicable to BWR plants only.

Loss of material of once-through type steam generators, as found in Babcock & Wilcox pressurized water reactors, is not applicable; since the HNP steam generators are of a recirculating design supplied by Westinghouse as described in FSAR Section 5.4.2.

3.1.2.2.2.2 BWR Isolation Condenser Components Exposed to Reactor Coolant

Loss of material of BWR isolation condenser components is applicable to BWR plants only.

3.1.2.2.2.3 Reactor Vessel Shells, Heads, and Welds; Flanges; Nozzles; Penetrations; Pressure Housings; and Safe Ends

Loss of material of BWR reactor vessel and reactor coolant pressure boundary components is applicable to BWR plants only.

3.1.2.2.2.4 PWR Steam Generator Shell and Transition Cone

Loss of material due to general, pitting, and crevice corrosion could occur in the steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam. HNP manages the steam generator shell and transition cone with a combination of the Water Chemistry Program together with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program for Class 2 components. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the loss of material aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, or IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants.

The replacement steam generators in use at HNP are the Westinghouse Delta 75 model as described in FSAR Section 5.4.2. Therefore, the augmented inspection recommended by NUREG-1801 is not applicable to HNP.

3.1.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement

3.1.2.2.3.1 Neutron Irradiation Embrittlement TLAA

Certain aspects of the loss of fracture toughness due to 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.

3.1.2.2.3.2 Reactor Vessel Embrittlement

Loss of fracture toughness due to neutron irradiation embrittlement could occur in the Reactor Vessel beltline, shell, nozzle, and welds. A materials surveillance program monitors neutron irradiation embrittlement of the Reactor Vessel. The materials outside of the traditional beltline region which are expected to receive fluence values greater than 10^{17} n/cm^2 were evaluated, and none of these materials was determined to be limiting. The HNP Reactor Vessel Surveillance Program, and the results of its evaluation for license renewal, are presented in Appendix B.

3.1.2.2.4 <u>Cracking Due to Stress Corrosion Cracking (SCC) and Intergranular Stress Corrosion Cracking (IGSCC)</u>

3.1.2.2.4.1 BWR Vessel Leak Detection Lines

Cracking of BWR vessel leak detection lines is applicable to BWR plants only.

3.1.2.2.4.2 BWR Isolation Condenser Components

Cracking of isolation condenser components is applicable to BWR plants only.

3.1.2.2.5 <u>Crack Growth Due to Cyclic Loading</u>

Crack growth due to cyclic loading associated with underclad cracking is not applicable to HNP. This issue was addressed during initial licensing in the Safety Evaluation Report (NUREG-1038). On page 5-7 of NUREG-1038, it states:

> "The controls imposed on weld cladding of low-alloy steel components by RG 1.43, 'Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components,' are not applicable because the steel was melted according to fine-grain practice, and low heat input weld cladding processes were used."

3.1.2.2.6 <u>Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement and Void Swelling</u>

Loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in stainless steel and nickel alloy reactor vessel Internals exposed to reactor coolant and neutron flux. HNP provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.7 Cracking Due to Stress Corrosion Cracking (SCC)

3.1.2.2.7.1 PWR Vessel Leak Detection Piping and Bottom-Mounted Instrument Guide Tubes

The reactor vessel flange and head are sealed by two metallic O-rings. Seal leakage is detected by means of two leak-off connections; one between the inner and outer O-ring, and one outside of the outer O-ring. Piping and associated valving are provided to direct any leakage to the reactor coolant drain tank. Excessive leakage will be indicated by a high temperature alarm from a detector in the leakoff line. Cracking due to SCC could occur in stainless steel PWR reactor vessel flange leak detection lines. Cracking from SCC of these lines is managed by a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

The Flux Thimble Guide Tubes are aligned to item 3.1.1-30 (IV.B2-12) for cracking due to SCC. See further evaluation for Subsection 3.1.2.2.12.

3.1.2.2.7.2 Cast Austenitic Stainless Steel (CASS) Reactor Coolant System Components

Cracking due to SCC could occur in Class 1 PWR CASS piping exposed to reactor coolant. Cracking due to SCC of the CASS reactor coolant system components is managed by a combination of the Water Chemistry Program together with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using procedures and processes for the prevention or mitigation of the cracking aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants.

3.1.2.2.8 Cracking Due to Cyclic Loading

3.1.2.2.8.1 BWR Jet Pump Sensing Lines

Cracking of BWR jet pump sensing line is applicable to BWR plants only.

3.1.2.2.8.2 BWR Isolation Condenser Components

Cracking of isolation condenser components is applicable to BWR plants only.

3.1.2.2.9 Loss of Preload Due to Stress Relaxation

Loss of preload due to stress relaxation could occur in stainless steel and nickel alloy PWR reactor vessel internal components exposed to reactor coolant. HNP provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.10 Loss of Material Due to Erosion

Loss of material due to erosion could occur in steel steam generator feedwater impingement plates and supports exposed to secondary feedwater. HNP uses the One-Time Inspection Program to manage loss of material due to erosion of the steam generator feedwater impingement plate components. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.1.2.2.11 Cracking Due to Flow-Induced Vibration of BWR Steam Dryers

Cracking of BWR steam dryer components is applicable to BWR plants only.

3.1.2.2.12 Cracking Due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking (IASCC)

Cracking due to SCC and IASCC could occur in PWR stainless steel reactor internals exposed to reactor coolant. HNP manages the reactor vessel internals components exposed to reactor coolant with the Water Chemistry Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect.

In addition, HNP provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.13 Cracking Due to Primary Water Stress Corrosion Cracking (PWSCC)

Cracking due to PWSCC could occur in PWR components made with nickel alloy and steel with nickel alloy cladding exposed to reactor coolant. Cracking due to SCC (including PWSCC) of nickel alloy and low alloy steel with nickel alloy cladding, including reactor coolant pressure boundary components and penetrations inside the RCS such as pressurizer heater sheaths and sleeves, nozzles, and other internal components is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants.

In addition, HNP provides in the FSAR Supplement a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

3.1.2.2.14 Wall Thinning Due to Flow-Accelerated Corrosion

Wall thinning due to flow-accelerated corrosion could occur in steam generator feedwater inlet rings and supports. HNP uses the One-Time Inspection Program to manage loss of material due to flow-accelerated corrosion of the steam generator feedwater distribution ring and related components. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.1.2.2.15 Changes in Dimensions Due to Void Swelling

Changes in dimensions due to void swelling could occur in stainless steel and nickel alloy PWR reactor vessel internal components exposed to reactor coolant. HNP provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.16 Cracking Due to Stress Corrosion Cracking and Primary Water Stress Corrosion Cracking

3.1.2.2.16.1 Control Rod Drive Head Penetration Pressure Housings

Cracking due to SCC is managed by the Water Chemistry Program in combination with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants. Only stainless steel or stainless steel-clad components are associated with this item. Therefore, no commitment regarding nickel alloys is necessary.

3.1.2.2.16.2 Pressurizer Spray Head

Cracking due to SCC could occur on stainless steel pressurizer spray heads; cracking due to PWSCC could affect nickel alloy pressurizer spray heads. The Pressurizer Spray Head at HNP is fabricated from cast austenitic stainless steel.

HNP manages cracking due to SCC of the Pressurizer Spray Head with a combination of Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

No licensee commitment regarding spray head inspection is required since the pressurizer spray head at HNP is fabricated from cast austenitic stainless steel.

3.1.2.2.17 Cracking Due to Stress Corrosion Cracking, Primary Water Stress Corrosion Cracking, and Irradiation-Assisted Stress Corrosion Cracking

Cracking due to SCC, PWSCC, or IASCC could occur in stainless steel and nickel alloy PWR reactor vessel internal components. HNP manages cracking due to SCC of the PWR stainless steel and nickel alloy reactor vessel internals components with the Water Chemistry Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect.

In addition, HNP provides in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.2.18 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.1.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components. The subsection of the application that contains the TLAA review results is indicated in parenthesis.

1. Neutron Irradiation Embrittlement (Section 4.2, Reactor Vessel Neutron Embrittlement)
2. Cumulative Fatigue Damage (Section 4.3, Metal Fatigue)
3. Cumulative Fatigue Damage (Section 4.7.4, High Energy Line Break Location Postulation Based on Fatigue Cumulative Usage Factor)

3.1.3 CONCLUSIONS

The Reactor Vessel, Internals, and Reactor Coolant System components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Reactor Vessel, Internals, and Reactor Coolant System components/ commodities will be maintained consistent with the current licensing basis during the period of extended operation.

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/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-01	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-02	BWR Only				
3.1.1-03	BWR Only				
3.1.1-04	BWR Only				
3.1.1-05	Stainless steel and nickel alloy reactor vessel internals components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-06	Nickel Alloy tubes and sleeves in a reactor coolant and secondary feedwater/steam environment	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-07	Steel and stainless steel reactor coolant pressure boundary closure bolting, head closure studs, support skirts and attachment welds, pressurizer relief tank components, steam generator components, piping and components external surfaces and bolting	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-08	Steel; stainless steel; and nickel-alloy reactor coolant pressure boundary piping, piping components, piping elements; flanges; nozzles and safe ends; pressurizer vessel shell heads and welds; heater sheaths and sleeves; penetrations; and thermal sleeves	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-09	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy reactor vessel components: flanges; nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads and welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-10	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy steam generator components (flanges; penetrations; nozzles; safe ends, lower heads and welds)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-11	BWR Only				

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-12	Steel steam generator shell assembly exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The HNP steam generators are recirculating and not the once-through type. Further evaluation is documented in Subsection 3.1.2.2.2.1.
3.1.1-13	BWR Only				
3.1.1-14	BWR Only				
3.1.1-15	BWR Only				
3.1.1-16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exception. HNP manages loss of material of steam generator components with a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation. Note that HNP has Westinghouse Model Delta 75 steam generators. Further evaluation is documented in Subsection 3.1.2.2.2.4.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-17	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99. The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations.	Yes, TLAA	Loss of fracture toughness due to neutron irradiation embrittlement is addressed as a TLAA. Further evaluation is documented in Subsection 3.1.2.2.3.1.
3.1.1-18	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance	Yes, plant specific	Consistent with NUREG-1801. The HNP Reactor Vessel Surveillance Program is used to manage the aging effects of loss of fracture toughness due to neutron irradiation embrittlement. The HNP reactor vessel does not have safety injection nozzles. Further evaluation is documented in Subsection 3.1.2.2.3.2.
3.1.1-19	BWR Only				
3.1.1-20	BWR Only				
3.1.1-21	Reactor vessel shell fabricated of SA508-Cl 2 forgings clad with stainless steel using a high-heat input welding process	Crack growth due to cyclic loading	TLAA	Yes, TLAA	This item is not applicable. The high-heat input welding process was not used at HNP. Further evaluation is documented in Subsection 3.1.2.2.5.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-22	Stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.6.
3.1.1-23	Stainless steel reactor vessel closure head flange leak detection line and bottom-mounted instrument guide tubes	Cracking due to stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMPs that manage the stainless steel reactor vessel closure head flange leak detection line are the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.1.2.2.7.1. The Flux Thimble Guide Tubes are aligned to item 3.1.1-30 (IV.B2-12) for cracking due to SCC. See further evaluation for Subsection 3.1.2.2.12.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-24	Class 1 cast austenitic stainless steel piping, piping components, and piping elements exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry and, for CASS components that do not meet the NUREG-0313 guidelines, a plant specific aging management program	Yes, plant specific	The plant-specific AMPs that manage class 1 cast austenitic stainless steel piping components exposed to reactor coolant are the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation. Further evaluation is documented in Subsection 3.1.2.2.7.2.
3.1.1-25	BWR Only				
3.1.1-26	BWR Only				
3.1.1-27	Stainless steel and nickel alloy reactor vessel internals screws, bolts, tie rods, and hold-down springs	Loss of preload due to stress relaxation	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.9.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-28	Steel steam generator feedwater impingement plate and support exposed to secondary feedwater	Loss of material due to erosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the One-Time Inspection Program. Further evaluation is documented in Subsection 3.1.2.2.10.
3.1.1-29	BWR Only				
3.1.1-30	Stainless steel reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Baffle/former assembly, Lower internal assembly, shroud assemblies, Plenum cover and plenum cylinder, Upper grid assembly, Control rod guide tube (CRGT) assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly, Thermal shield, Instrumentation support structures)	Cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. HNP manages the reactor vessel internals components exposed to reactor coolant with the Water Chemistry Program. The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.12.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-31	Nickel alloy and steel with nickel-alloy cladding piping, piping component, piping elements, penetrations, nozzles, safe ends, and welds (other than reactor vessel head); pressurizer heater sheaths, sleeves, diaphragm plate, manways and flanges; core support pads/core guide lugs	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and FSAR supp commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins, and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.13. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.
3.1.1-32	Steel steam generator feedwater inlet ring and supports	Wall thinning due to flow-accelerated corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the One-Time Inspection Program. Further evaluation is documented in Subsection 3.1.2.2.14.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-33	Stainless steel and nickel alloy reactor vessel internals components	Changes in dimensions due to void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.15.
3.1.1-34	Stainless steel and nickel alloy reactor control rod drive head penetration pressure housings	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801 with exception. Cracking is managed by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. Further evaluation is documented in Subsection 3.1.2.2.16.1. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	This item is not applicable. The HNP steam generators are recirculating and not once-through as described in FSAR Section 5.4.2. No licensee commitment is required.
3.1.1-36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry and One-Time Inspection and, for nickel alloy welded spray heads, provide commitment in FSAR supplement to submit AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	No, unless licensee commitment needs to be confirmed	Consistent with NUREG-1801. HNP manages cracking with a combination of Water Chemistry Program and the One-Time Inspection Program. No licensee commitment is required since the pressurizer spray head at HNP is fabricated from cast austenitic stainless steel. Further evaluation is documented in Subsection 3.1.2.2.16.2.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-37	Stainless steel and nickel alloy reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Lower internal assembly, CEA shroud assemblies, Core shroud assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly)	Cracking due to stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. HNP manages cracking with the Water Chemistry Program. The HNP commitment is described in the FSAR supplement. Further evaluation is documented in Subsection 3.1.2.2.17.
3.1.1-38	BWR Only				
3.1.1-39	BWR Only				
3.1.1-40	BWR Only				
3.1.1-41	BWR Only				
3.1.1-42	BWR Only				
3.1.1-43	BWR Only				
3.1.1-44	BWR Only				
3.1.1-45	BWR Only				
3.1.1-46	BWR Only				
3.1.1-47	BWR Only				
3.1.1-48	BWR Only				

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-49	BWR Only				
3.1.1-50	BWR Only				
3.1.1-51	BWR Only				
3.1.1-52	Steel and stainless steel reactor coolant pressure boundary (RCPB) pump and valve closure bolting, manway and holding bolting, flange bolting, and closure bolting in high-pressure and high-temperature systems	Cracking due to stress corrosion cracking, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801 with exceptions. The HNP Bolting Integrity Program addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The program is based on industry recommendations and EPRI guidance which considers material properties, joint/gasket design, service requirements, and industry/site operating experience in specifying torque and closure requirements, with additional programmatic inspections and requirements as needed to adequately manage aging effects. The exception involves differences from the NUREG-1801 recommendations for the Bolting Integrity Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-53	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for Closed-Cycle Cooling Water System Program implementation.
3.1.1-54	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable.
3.1.1-55	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection (IWB, IWC, and IWD). Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The exception involves differences from the NUREG-1801 recommendations for the Program implementation. ASME Code Case N-481 has been deleted, and its requirements have been incorporated into the ASME Code.
3.1.1-56	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-57	Cast austenitic stainless steel Class 1 piping, piping component, and piping elements and control rod drive pressure housings exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	This item is not applicable. The subject components have been screened and found to be not susceptible to thermal aging embrittlement based on the information provided in a letter from C.I. Grimes (USNRC) to D. Walters (NEI), License Renewal Issue No. 98-0030, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components, May 19, 2000.
3.1.1-58	Steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.1.1-59	Steel steam generator steam nozzle and safe end, feedwater nozzle and safe end, AFW nozzles and safe ends exposed to secondary feedwater/steam	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion	No	Consistent with NUREG-1801. The aging effect for the feedwater nozzle is managed by the Flow-Accelerated Corrosion Program. The steam generator steam nozzle and auxiliary feedwater nozzle have been determined to not be susceptible to this aging effect.
3.1.1-60	Stainless steel flux thimble tubes (with or without chrome plating)	Loss of material due to Wear	Flux Thimble Tube Inspection	No	Consistent with NUREG-1801. The aging effect is managed by the Flux Thimble Tube Inspection Program.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-61	Stainless steel, steel pressurizer integral support exposed to air with metal temperature up to 288°C (550°F)	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	Although cracking due to cyclic loading is not applicable to this specific pressurizer subcomponent, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is used to manage cracking of the pressurizer (See 3.1.1-68).
3.1.1-62	Stainless steel, steel with stainless steel cladding reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	Although cracking due to cyclic loading is not is not applicable to these reactor coolant pressure boundary components, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is used to manage cracking of these lines (See 3.1.1-68).
3.1.1-63	Steel reactor vessel flange, stainless steel and nickel alloy reactor vessel internals exposed to reactor coolant (e.g., upper and lower internals assembly, CEA shroud assembly, core support barrel, upper grid assembly, core support shield assembly, lower grid assembly)	Loss of material due to Wear	Inservice Inspection (IWB, IWC, and IWD)	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-64	Stainless steel and steel with stainless steel or nickel alloy cladding pressurizer components	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and the Water Chemistry Programs. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.
3.1.1-65	Nickel alloy reactor vessel upper head and control rod drive penetration nozzles, instrument tubes, head vent pipe (top head), and welds	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	No	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the Water Chemistry Program, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, and the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-66	Steel steam generator secondary manways and handholds (cover only) exposed to air with leaking secondary-side water and/or steam	Loss of material due to erosion	Inservice Inspection (IWB, IWC, and IWD) for Class 2 components	No	Loss of material due to erosion of once-through type steam generators, as found in Babcock & Wilcox pressurized water reactors is not applicable, since the HNP steam generators are of a recirculating design supplied by Westinghouse as described in FSAR Section 5.4.2.
3.1.1-67	Steel with stainless steel or nickel alloy cladding; or stainless steel pressurizer components exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Although cracking due to cyclic loading is not is not applicable to the HNP pressurizer, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program are used to manage cracking of the pressurizer (See 3.1.1-68).
3.1.1-68	Stainless steel, steel with stainless steel cladding Class 1 piping, fittings, pump casings, valve bodies, nozzles, safe ends, manways, flanges, CRD housing; pressurizer heater sheaths, sleeves, diaphragm plate; pressurizer relief tank components, reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings	Cracking due to stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-69	Stainless steel, nickel alloy safety injection nozzles, safe ends, and associated welds and buttering exposed to reactor coolant	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the Water Chemistry Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program implementation.
3.1.1-70	Stainless steel; steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant	Cracking due to stress corrosion cracking, thermal and mechanical loading	Inservice Inspection (IWB, IWC, and IWD), Water chemistry, and One-Time Inspection of ASME Code Class 1 Small-bore Piping	No	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the Water Chemistry Program, the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program, and the One-Time Inspection of ASME Code Class 1 Small-bore Piping Program. The exception involves differences from the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program and the One-Time Inspection of ASME Code Class 1 Small-bore Piping Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-71	High-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to wear	Reactor Head Closure Studs	No	Consistent with NUREG-1801 with exception. The aging effects are managed by the Reactor Head Closure Studs Program. The exception involves differences from the NUREG-1801 recommendations for the Reactor Head Closure Studs Program implementation.
3.1.1-72	Nickel alloy steam generator tubes and sleeves exposed to secondary feedwater/ steam	Cracking due to OD stress corrosion cracking and intergranular attack, loss of material due to fretting and wear	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effects are managed by a combination of the Steam Generator Tube Integrity and the Water Chemistry Programs. The exception involves differences from the NUREG-1801 recommendations for the Steam Generator Tube Integrity Program implementation.
3.1.1-73	Nickel alloy steam generator tubes, repair sleeves, and tube plugs exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effect is managed by a combination of the Steam Generator Tube Integrity and the Water Chemistry Programs. The exception involves differences from the NUREG-1801 recommendations for the Steam Generator Tube Integrity Program implementation.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-74	Chrome plated steel, stainless steel, nickel alloy steam generator anti-vibration bars exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking, loss of material due to crevice corrosion and fretting	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 with exception. The aging effects are managed by a combination of the Steam Generator Tube Integrity and the Water Chemistry Programs. The exception involves differences from the NUREG-1801 recommendations for the Steam Generator Tube Integrity Program implementation.
3.1.1-75	Nickel alloy once-through steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of carbon steel tube support plate	Steam Generator Tube Integrity and Water Chemistry	No	Denting due to corrosion of the carbon steel tube support plate of once-through type steam generators, as found in Babcock & Wilcox pressurized water reactors is not applicable, since the HNP steam generators are of a recirculating design supplied by Westinghouse as described in FSAR Section 5.4.2.
3.1.1-76	Steel steam generator tube support plate, tube bundle wrapper exposed to secondary feedwater/steam	Loss of material due to erosion, general, pitting, and crevice corrosion, ligament cracking due to corrosion	Steam Generator Tube Integrity and Water Chemistry	No	Ligament cracking due to corrosion of the steel steam generator tube support plate (Unique Item IV.D1-17) is not applicable to HNP. All tube support plates are made of type 405 ferritic stainless steel as described in FSAR Section 5.4.2.1.2. (continued)

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-76 (continued)					Consistent with NUREG-1801 with exception. Loss of material of the tube bundle wrapper is managed by a the Steam Generator Tube Integrity and the Water Chemistry Programs. The exception involves differences from the NUREG-1801 recommendations for the Steam Generator Tube Integrity Program implementation.
3.1.1-77	Nickel alloy steam generator tubes and sleeves exposed to phosphate chemistry in secondary feedwater/ steam	Loss of material due to wastage and pitting corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable. HNP does not use phosphate chemistry.
3.1.1-78	Steel steam generator tube support lattice bars exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable. The HNP steam generators do not have lattice bars.
3.1.1-79	Nickel alloy steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of steel tube support plate	Steam Generator Tube Integrity; Water Chemistry and, for plants that could experience denting at the upper support plates, evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02.	No	This item is not applicable. All tube support plates are made of type 405 ferritic stainless steel as described in FSAR Section 5.4.2.1.2.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-80	Cast austenitic stainless steel reactor vessel internals (e.g., upper internals assembly, lower internal assembly, CEA shroud assemblies, control rod guide tube assembly, core support shield assembly, lower grid assembly)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of CASS	No	Consistent with NUREG-1801. The aging effect is managed by the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program.
3.1.1-81	Nickel alloy or nickel-alloy clad steam generator divider plate exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.1.1-82	Stainless steel steam generator primary side divider plate exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry	No	The item is not applicable. The steam generator primary side divider plate is fabricated from thermally-treated Alloy 690.
3.1.1-83	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor vessel internals and reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.

TABLE 3.1.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER IV OF NUREG-1801 FOR REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1-84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection or Inservice Inspection (IWB, IWC, and IWD).	No	Cracking due to stress corrosion cracking of nickel alloy steam generator components such as, secondary side nozzles of once-through type steam generators, as found in Babcock & Wilcox pressurized water reactors is not applicable, since the HNP steam generators are of a recirculating design supplied by Westinghouse as described in FSAR Section 5.4.2.
3.1.1-85	Nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-86	Stainless steel piping, piping components, and piping elements exposed to air – indoor uncontrolled (External); air with borated water leakage; concrete; gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-87	Steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	HNP has no components within the scope of license renewal in concrete in the reactor vessel, internals, and reactor coolant systems, so the applicable NUREG-1801 line was not used.

TABLE 3.1.2-1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Closure Head Dome	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Closure Head Flange	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Closure Head Flange (continued)	M-4	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Closure Head Stud Assembly	M-1	High Strength Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Cracking due to SCC	Reactor Head Closure Studs	IV.A2-2 (R-71)	3.1.1-71	B
				Loss of Material due to Wear	Reactor Head Closure Studs	IV.A2-3 (R-72)	3.1.1-71	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-4 (R-73)	3.1.1-07	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Vessel Flange Leak Detection Line	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.A2-5 (R-74)	3.1.1-23	E
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Vessel; CRDM Head Penetration Nozzle	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-9 (R-75)	3.1.1-65	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; CRDM Head Penetration Nozzle (continued)	M-4	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-9 (R-75)	3.1.1-65	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; CRDM Head Penetration Flange	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
	M-4	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CRDM Latch Housings	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
	M-4	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CRDM Rod Travel Housings	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
	M-4	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; CRDM Head Penetration Thermal Sleeves	M-6	Stainless Steel	Treated Water (Outside)	None	None			J, 113
Reactor Vessel; Head Adapter Plug	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Reactor Vessel; Head Lifting Lugs	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Ventilation Shroud Support Ring	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Seal Assembly Retaining Clamps and Closure Bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	D
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
Reactor Vessel; Seal Assemblies (Core Exit Thermocouples)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-11 (R-76)	3.1.1-34	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Primary Nozzles	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Primary Nozzle Support Pads	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-20 (R-70)	3.1.1-01	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Primary Nozzle Safe Ends	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Reactor Vessel; Primary Nozzle Welds	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Upper Shell	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Intermediate Shell	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA, evaluated in accordance with App. G of 10 CFR 50 and RG 1.99.	IV.A2-23 (R-84)	3.1.1-17	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Intermediate Shell (continued)	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Lower Shell	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA, evaluated in accordance with App. G of 10 CFR 50 and RG 1.99.	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Lower Shell (continued)	M-4	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA, evaluated in accordance with App. G of 10 CFR 50 and RG 1.99.	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Beltline Welds	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	TLAA, evaluated in accordance with App. G of 10 CFR 50 and RG 1.99.	IV.A2-23 (R-84)	3.1.1-17	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance	IV.A2-24 (R-86)	3.1.1-18	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Vessel Flange and Core Support Ledge	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
	M-4	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Bottom Head (Dome and Torus)	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-15 (R-83)	3.1.1-69	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.A2-13 (R-17)	3.1.1-58	A
Reactor Vessel; Core Support Pads (Clevis)	M-4	Nickel Base Alloys	Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-12 (R-88)	3.1.1-31	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Instrument Tubes (Bottom Head)	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-19 (R-89)	3.1.1-31	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
	M-4	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.A2-19 (R-89)	3.1.1-31	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Vessel; Head Vent Pipe (Top Head)	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.A2-21 (R-219)	3.1.1-09	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and Nickel-Alloy Penetration Nozzles Welded to the Upper reactor Vessel Closure Heads of Pressurized Water Reactors	IV.A2-18 (R-90)	3.1.1-65	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Upper Internals; Upper Support Plate	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-42 (R-106)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-41 (R-107)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Plate (continued)	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Internals; Upper Support Column	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-36 (R-109)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-35 (R-110)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Column (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-36 (R-109)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-35 (R-110)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Column Bolts	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-40 (R-112)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-39 (R-113)	3.1.1-33	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-38 (R-114)	3.1.1-27	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Column Bolts (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-40 (R-112)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-39 (R-113)	3.1.1-33	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-38 (R-114)	3.1.1-27	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Column Spider	M-10	Cast Austenitic Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-36 (R-109)	3.1.1-30	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-37 (R-111)	3.1.1-80	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Support Column Spider (continued)	M-12	Cast Austenitic Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-36 (R-109)	3.1.1-30	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-37 (R-111)	3.1.1-80	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Core Plate	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-42 (R-106)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-41 (R-107)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Core Plate (continued)	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-42 (R-106)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-41 (R-107)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Fuel Alignment Pins	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC	Water Chemistry	IV.B2-40 (R-112)	3.1.1-37	A
				Cracking due to SCC				
				Change in Dimensions due to Void Swelling	None	IV.B2-39 (R-113)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Hold-down Spring	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-42 (R-106)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-41 (R-107)	3.1.1-33	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-33 (R-108)	3.1.1-27	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Hold-down Spring (continued)	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-42 (R-106)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-41 (R-107)	3.1.1-33	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-33 (R-108)	3.1.1-27	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; RCCA Guide Tubes	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-30 (R-116)	3.1.1-30	A
				Change in Dimensions due to Void Swelling	None	IV.B2-29 (R-117)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; RCCA Guide Tube Bolts	M-10	Stainless Steel	Treated Water (Outside)	Loss of Preload due to Stress Relaxation	None	IV.B2-38 (R-114)	3.1.1-27	C
				Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-28 (R-118)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-27 (R-119)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; RCCA Guide Tube Support Pins (split pins)	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-28 (R-118)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-27 (R-119)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Head and Vessel Alignment Pins	M-10	Stainless Steel	Treated Water (Outside)	Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B2-34 (R-115)	3.1.1-63	D
				Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	C
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Head Cooling Spray Nozzles	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	C
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Core Plate Alignment Pins	M-10	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-40 (R-112)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-39 (R-113)	3.1.1-33	A
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B2-34 (R-115)	3.1.1-63	B
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Internals; Upper Instrumentation Column, Conduit, and Supports	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-36 (R-109)	3.1.1-30	C
				Change in Dimensions due to Void Swelling	None	IV.B2-35 (R-110)	3.1.1-33	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Core Barrel	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Core Barrel (continued)	M-14	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Core Barrel Flange	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Core Barrel Flange (continued)	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-14	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Core Barrel Outlet Nozzles	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Thermal Shield	M-14	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-8 (R-120)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-9 (R-122)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Baffle and Former Plates	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-2 (R-123)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-3 (R-127)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-2 (R-123)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-3 (R-127)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Baffle and Former Plates (continued)	M-14	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-2 (R-123)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-3 (R-127)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Baffle/Former Bolts	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-10 (R-125)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-6 (R-128)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-5 (R-129)	3.1.1-27	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Baffle/Former Bolts (continued)	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Barrel/Former Bolts	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-10 (R-125)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-6 (R-128)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-5 (R-129)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Core Plate	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Core Plate (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Fuel Alignment Pins	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Lower Support Forging	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Forging (continued)	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Forging (continued)	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Lower Support Plate Columns	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Plate Columns (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; BMI Columns	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	C
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-22 (R-141)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; BMI Column Cruciforms	M-12	Cast Austenitic Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement Loss of Fracture Toughness due to Thermal Embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-21 (R-140)	3.1.1-80	A
				Change in Dimensions due to Void Swelling	None	IV.B2-22 (R-141)	3.1.1-22	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Plate Column Bolts	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-25 (R-136)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Plate Column Bolts (continued)	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-25 (R-136)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Plate Column Bolts (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-25 (R-136)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Lower Support Plate Column Bolts (continued)	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-25 (R-136)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Radial Support Keys	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling	None	IV.B2-19 (R-131)	3.1.1-33	A
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	C
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B2-26 (R-142)	3.1.1-63	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Radial Support Key Bolts	M-9	Nickel Base Alloys	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	C
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	C
				Loss of Preload due to Stress Relaxation	None	IV.B2-14 (R-137)	3.1.1-27	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Clevis Inserts	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	C
				Loss of Material due to Wear	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.B2-26 (R-142)	3.1.1-63	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Clevis Insert Bolts	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-16 (R-133)	3.1.1-37	A
				Change in Dimensions due to Void Swelling Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-17 (R-135)	3.1.1-22	A
				Loss of Preload due to Stress Relaxation	None	IV.B2-14 (R-137)	3.1.1-27	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Tie Plate (Upper and Lower)	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Tie Plate (Upper and Lower) (continued)	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Diffuser Plate	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Secondary Core Support	M-9	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-11	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Secondary Core Support (continued)	M-12	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
	M-13	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Internals; Irradiation Specimen Guide	M-4	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Lower Internals; Specimen Plugs	M-4	Stainless Steel	Treated Water (Outside)	Cracking due to IASCC Cracking due to SCC	Water Chemistry	IV.B2-20 (R-130)	3.1.1-37	C
				Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	None	IV.B2-18 (R-132)	3.1.1-22	C
				Change in Dimensions due to Void Swelling	None	IV.B2-23 (R-139)	3.1.1-33	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flux Thimble Guide Tubes	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	IV.B2-12 (R-143)	3.1.1-30	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
	M-4	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	IV.B2-12 (R-143)	3.1.1-30	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flux Thimble Seals	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking due to SCC	Water Chemistry	IV.B2-12 (R-143)	3.1.1-30	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
Containment Isolation Piping and Components	M-1	Stainless Steel	Silicone Fluid (Inside)	None	None			J, 116
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-1 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION - REACTOR VESSEL AND INTERNALS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Silicone Fluid (Inside)	None	None			J, 116
			Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Solenoid Valves	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-2 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – INCORE INSTRUMENTATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flux Thimble Tubes	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	IV.E-2 (RP-04)		G, 111
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
			Treated Water (Outside)	Cracking due to SCC	Water Chemistry	IV.B2-24 (R-138)	3.1.1-30	A
				Loss of Material due to Wear	Flux Thimble Tube Inspection	IV.B2-13 (R-145)	3.1.1-60	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.B2-31 (R-53)	3.1.1-05	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.B2-32 (RP-24)	3.1.1-83	A
Flux Thimble Isolation Valves	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	IV.E-2 (RP-04)		G, 111
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-3 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Class 1 piping, fittings and branch connections < NPS 4	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection, Water Chemistry, and One-Time Inspection of ASME Code Class 1 Small-Bore Piping	IV.C2-1 (R-02)	3.1.1-70	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
Containment Isolation Piping and Components	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A, 110
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-3 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Cast Austenitic Stainless Steel	Treated Water (Inside)	Loss of Fracture Toughness due to Thermal Embrittlement	None			I, 109, 118
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A, 109
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 109
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-3 (RP-23)	3.1.1-24	E, 109, 112
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A, 109
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	B
				Loss of Material due to Pitting Corrosion Loss of Material due to Crevice Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-4 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP AND MOTOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Pumps (Casings)	M-1	Cast Austenitic Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Loss of Fracture Toughness due to Thermal Embrittlement	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.C2-6 (R-08)	3.1.1-55	B
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-5 (R-09)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Reactor Coolant Pump Closure Bolting	M-1	High Strength Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to SCC	Bolting Integrity	IV.C2-7 (R-11)	3.1.1-52	B
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
RCP Oil Cooler/Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	V.A-25 (EP-46)	3.2.1-16	C, 102

TABLE 3.1.2-4 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP AND MOTOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Oil Cooler/Heat Exchanger Components (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	IV.C2-14 (RP-10)	3.1.1-53	B, 101
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A, 105
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 105
		Copper Alloy <15% Zn	Treated Water (Inside)	None	None	VII.J-5 (AP-11)		G, 104
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C1-8 (AP-47)	3.3.1-26	C, 103

TABLE 3.1.2-4 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP AND MOTOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Thermal Barrier Heat Exchanger Components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.A-7 (E-19)	3.2.1-28	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	V.A-24 (EP-44)	3.2.1-25	D
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-22 (R-14)	3.1.1-68	D
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	C
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	D
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	D

TABLE 3.1.2-4 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP AND MOTOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Lube Oil Collection Tank	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-27 (A-82)	3.3.1-16	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
RCP Oil Spill Protection System Piping	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-26 (A-83)	3.3.1-15	A
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-26 (A-83)		H

TABLE 3.1.2-4 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR COOLANT PUMP AND MOTOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP Oil Spill Protection System Piping (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-18 (AP-59)	3.3.1-33	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.1.2-5 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Shell	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Lower Head	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Upper Head	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Valve Support Bracket Lugs	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
Pressurizer Spray Nozzle	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Spray Nozzle (continued)	M-1	Alloy Steel with Stainless Steel Cladding	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Relief Nozzle	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Safety Nozzle	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Surge Nozzle	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Spray Head	M-8	Cast Austenitic Stainless Steel	Treated Water (Inside)	Loss of Fracture Toughness due to Thermal Embrittlement	None			I, 118, 119
				Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.C2-17 (R-24)	3.1.1-36	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Spray Head (continued)	M-8	Cast Austenitic Stainless Steel	Treated Water (Outside)	Loss of Fracture Toughness due to Thermal Embrittlement	None			I, 118, 119
				Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.C2-17 (R-24)	3.1.1-36	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Spray Head Coupling	M-4	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.C2-17 (R-24)	3.1.1-36	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated Water (Outside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.C2-17 (R-24)	3.1.1-36	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer Spray Head Locking Bar	M-4	Stainless Steel	Treated Water (Outside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	IV.C2-17 (R-24)	3.1.1-36	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Surge Nozzle Thermal Sleeve	M-6	Stainless Steel	Treated Water (Inside)	None	None			J, 113
			Treated Water (Outside)	None	None			J, 113
Pressurizer Spray Nozzle Thermal Sleeve	M-6	Stainless Steel	Treated Water (Inside)	None	None			J, 113
			Treated Water (Outside)	None	None			J, 113
Pressurizer Instrument Nozzles	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Spray Nozzle Safe End	M-1	Nickel Base Alloys	Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 124
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Relief Nozzle Safe End	M-1	Nickel Base Alloys	Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 124
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Safety Nozzle Safe End	M-1	Nickel Base Alloys	Air - Indoor (Inside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 124
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Surge Nozzle Safe End	M-1	Nickel Base Alloys	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A, 125
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-24 (RP-22)	3.1.1-31	B, 125
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 125
			Air - Indoor (Outside)	None	None	IV.E-1 (RP-03)	3.1.1-85	A, 125

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Surge Nozzle Safe End (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Manway Covers/Insert	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 115
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-2 (R-07)	3.1.1-68	B, 115
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Manway Studs	M-1	High Strength Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	C
				Cracking due to SCC	Bolting Integrity	IV.C2-7 (R-11)	3.1.1-52	B
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
				Loss of Material due to Wear	Bolting Integrity	IV.C2-8 (R-12)		H
Pressurizer Manway Nuts	M-1	High Strength Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	C
				Cracking due to SCC	Bolting Integrity	IV.C2-7 (R-11)	3.1.1-52	B
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
				Loss of Material due to Wear	Bolting Integrity	IV.C2-8 (R-12)		H

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Manway Pad Gasket Seating Surface	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-19 (R-25)	3.1.1-64	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
Pressurizer Heater Well Nozzles	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-20 (R-217)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Immersion Heaters	M-1	Stainless Steel	Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
			Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-20 (R-217)	3.1.1-68	B
Pressurizer Support Skirt and Flange	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
Pressurizer Seismic Lugs	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Relief Tank Shell and Heads	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-23 (R-13)	3.1.1-07	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-22 (R-14)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Relief Tank Flanges	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-23 (R-13)	3.1.1-07	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-22 (R-14)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer Relief Tank Nozzles	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-23 (R-13)	3.1.1-07	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-22 (R-14)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Pressurizer Relief Tank Rupture Disk	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-23 (R-13)	3.1.1-07	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-22 (R-14)	3.1.1-68	B
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	D
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
		Stainless Steel	Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.C2-8 (R-12)	3.1.1-52	B
Containment Isolation Piping and Components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Filter Housings (Air/Gas)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter Housings (Air/Gas) (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 114
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
			Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-25 (R-223)	3.1.1-08	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.C2-27 (R-30)	3.1.1-68	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-5 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – PRESSURIZER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer PORV Accumulators	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.C2-9 (R-17)	3.1.1-58	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 114
Pressurizer PORV Flex Hoses	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Regulators	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VII.J-2 (AP-37)	3.3.1-97	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.A3-4 (AP-1)	3.3.1-88	C
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	IV.E-5 (RP-07)	3.1.1-86	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A

TABLE 3.1.2-6 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Instrument Manifolds and Valves	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A, 106
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	A, 106
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A, 106
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)		F, 106
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A, 106
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A, 106
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elliptical Head	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	D
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Steam Nozzle	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	D
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Nozzle Flow Limiter	M-3	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-1 (SP-18)	3.4.1-37	A, 108
				Cracking due to SCC	Water Chemistry	VIII.B1-1 (SP-18)		H, 108
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-1 (SP-18)	3.4.1-37	A, 108
				Cracking due to SCC	Water Chemistry	VIII.B1-1 (SP-18)		H, 108
Steam Generator Upper Shell	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator Lower Shell	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Transition Cone	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Nozzle	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	D
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	IV.D1-5 (R-37)	3.3.1-59	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Feedwater Nozzle Thermal Sleeve	M-4	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 120
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 120
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 120
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 120

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Nozzle Thermal Sleeve (continued)	M-6	Nickel Base Alloys	Treated Water (Inside)	None	None			J, 113
			Treated Water (Outside)	None	None			J, 113
Auxiliary Feedwater Nozzle	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	D
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Auxiliary Nozzle Thermal Sleeve	M-1	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 121
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 121
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 121
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 121

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Nozzle Thermal Sleeve (continued)	M-6	Nickel Base Alloys	Treated Water (Inside)	None	None			J, 113
			Treated Water (Outside)	None	None			J, 113
Steam generator feedwater impingement plate and support	M-3	Carbon or Low Alloy Steel	Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Erosion	One-Time Inspection	IV.D1-13 (R-39)	3.1.1-28	E
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	IV.D1-13 (R-39)		H
Secondary Manway Covers	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Secondary Manway Bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D1-10 (R-32)	3.1.1-52	B
Inspection Port and Handhole Covers	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Inspection Port and Handhole Closure Bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D1-10 (R-32)	3.1.1-52	B

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sludge Collector Maintenance Opening Covers	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Sludge Collector Maintenance Openings Closure Bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D1-10 (R-32)	3.1.1-52	B
Channel Head	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-1 (R-07)	3.1.1-68	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator; Divider Plate	M-4	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	Water Chemistry	IV.D1-6 (RP-21)	3.1.1-81	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	Water Chemistry	IV.D1-6 (RP-21)	3.1.1-81	A
Steam Generator Support Ring	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Steam Generator Primary Nozzles	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-1 (R-07)	3.1.1-68	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam Generator Primary Nozzle Safe Ends	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-1 (R-07)	3.1.1-68	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
			Air - Indoor (Outside)	None	None	IV.E-2 (RP-04)	3.1.1-86	A
Secondary Side Shell Penetrations (except Steam and Feedwater)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-11 (R-33)	3.1.1-07	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-12 (R-34)	3.1.1-16	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Manway Cover/Inserts	M-1	Alloy Steel with Stainless Steel Cladding	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 115
				Cracking due to SCC	ASME Section XI Inservice Inspection and Water Chemistry	IV.D1-1 (R-07)	3.1.1-68	B, 115
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
Primary Manway Bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.C2-10 (R-18)	3.1.1-07	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	IV.D1-10 (R-32)	3.1.1-52	B

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubeplate	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
			Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)	3.1.1-76	D
		Nickel Base Alloys	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 107
				Cracking due to SCC	Water Chemistry	IV.D1-6 (RP-21)	3.1.1-81	C, 107
	M-4	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3 (R-17)	3.1.1-58	A
			Treated Water (Outside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-8 (R-221)	3.1.1-10	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)	3.1.1-76	D

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubeplate (continued)	M-4	Nickel Base Alloys	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	A, 107
				Cracking due to SCC	Water Chemistry	IV.D1-6 (RP-21)	3.1.1-81	C, 107
Tubes	M-1	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-20 (R-44)	3.1.1-73	B
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-21 (R-46)	3.1.1-06	A

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tubes (continued)	M-1	Nickel Base Alloys	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	IV.D1-21 (R-46)	3.1.1-06	A
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-23 (R-47)	3.1.1-72	B
				Loss of Material due to Fretting	Steam Generator Tube Integrity and Water Chemistry	IV.D1-24 (R-49)	3.1.1-72	B
	M-5	Nickel Base Alloys	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry	IV.C2-15 (RP-23)		H, 117
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry	IV.C2-15 (RP-23)		H, 117

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tube plugs	M-1	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-18 (R-40)	3.1.1-73	B
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-18 (R-40)	3.1.1-73	B
Tube Support Plates and Flow Distribution Baffles	M-4	Stainless Steel	Treated Water (Outside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-17 (R-42)		F

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam generator; tube bundle wrapper	M-3	Carbon or Low Alloy Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Erosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)	3.1.1-76	B
	M-4	Carbon or Low Alloy Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Erosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)	3.1.1-76	B
Steam generator; anti-vibration bars	M-4	Nickel Base Alloys	Treated Water (Outside)	Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-14 (RP-14)	3.1.1-74	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Fretting	Steam Generator Tube Integrity and Water Chemistry	IV.D1-15 (RP-15)	3.1.1-74	B
				Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-15 (RP-15)		H

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steam generator; anti-vibration bars (continued)	M-4	Stainless Steel	Treated Water (Outside)	Cracking due to SCC	Steam Generator Tube Integrity and Water Chemistry	IV.D1-14 (RP-14)	3.1.1-74	B
				Loss of Material due to Crevice Corrosion Loss of Material due to Fretting	Steam Generator Tube Integrity and Water Chemistry	IV.D1-15 (RP-15)	3.1.1-74	B
				Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-15 (RP-15)		H
Tube Bundle Support Hardware	M-4	Carbon or Low Alloy Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)	3.1.1-76	B
		Nickel Base Alloys	Treated Water (Outside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Steam Generator Tube Integrity and Water Chemistry	IV.D1-9 (RP-16)		F

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Feedwater Distribution Ring and Supports	M-4	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	One-Time Inspection	IV.D1-26 (R-51)	3.1.1-32	E
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
Feedwater Distribution Ring Spray Nozzles	M-4	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 122
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 122
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F, 122
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F, 122

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Internal Spray Pipe	M-1	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)		F, 123
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)		F, 123
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)		F, 123
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)		F, 123
	M-8	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)		F, 123
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)		F, 123
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)		F, 123
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)		F, 123

TABLE 3.1.2-6 (continued) REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM - SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Moisture Separator Assembly	M-4	Carbon or Low Alloy Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
Miscellaneous Non-Pressure Boundary Internals	M-4	Carbon or Low Alloy Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	C
		Nickel Base Alloys	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)		F
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)		F
		Stainless Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A

Notes for Tables 3.1.2-1 through 3.1.2-6:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
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:

101. This represents an evaluation of the RCP Oil Cooler/Heat Exchanger channel head.
102. This represents an evaluation of the RCP Oil Cooler/Heat Exchanger shell.
103. This represents an evaluation of the RCP Oil Cooler/Heat Exchanger tubes.
104. The HNP AMR methodology concluded that copper alloys with a Zn content less than 15% are not subject to cracking or loss of material in a treated water environment.
105. This represents an evaluation of the RCP Oil Cooler/Heat Exchanger shell and channel head.
106. The instrument valves and manifolds are associated with the steam generator level instrumentation. The piping is part of the Feedwater System. This commodity is aligned with Section VIII of NUREG-1801 accordingly.
107. The nickel base alloy represents the cladding on the primary side of the tubeplate.
108. For the purposes of alignment, the Steam Nozzle Flow Limiter is considered an extension of the Main Steam System as described in VIII.B1 of NUREG-1801.
109. The elbows in the primary loop piping are fabricated from SA351 CF8A material.

110. This environment applies to the containment isolation components that provide nitrogen to the Pressurizer Relief Tank. Reference Penetration M-77B on FSAR Table 6.2.4-1.
111. This internal environment is not normally expected to have condensation.
112. Cracking due to SCC could occur in PWR CASS reactor coolant system piping and fittings. For PWRs, NUREG-1801 recommends further evaluation of piping that does not meet the reactor water chemistry guidelines of TR-105714, "PWR Primary Water Chemistry Guidelines, Revision 3," November 1995, or later. Since HNP uses the latest version of the EPRI Water Chemistry Guidelines, no further evaluation of a plant-specific AMP is required because the HNP AMP minimizes the potential for SCC in accordance with NUREG-1801. In addition, HNP uses the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program to manage cracking of CASS components.
113. This line item represents a thermal sleeve with an intended function for insulation. Aging effects associated with this component include cracking and loss of material. However, these aging effects do not affect the insulation (M-6) component intended function.
114. Humidity control is normally not assumed for the Air - Indoor and Air - Outdoor service environments. In these service environments, the HNP AMR methodology for steel (surface temperature < 212°F) always predicts general, crevice, and pitting corrosion. For PWRs, NUREG-1801 manages loss of material on the external surfaces of steel components with XI.M36, External Surfaces Monitoring Program. In some instances, NUREG-1801 lists general, crevice, and pitting corrosion as applicable aging mechanisms (AP-41); and, in other cases, only general corrosion (E-26, E-35, E-44, A-80, A-10, A-105, A-77, and S-29) is listed. The program description in Section XI of NUREG-1801 states: "This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual examination of external surfaces for evidence of material loss."
115. The Pressurizer manway does not use cladding but rather a stainless steel insert.
116. The silicone fluid is the capillary fluid for the instrumentation. This fluid is controlled to preclude the introduction of contaminants. The design of the component inherently resists the intrusion of water. Therefore, the environment is considered benign to stainless steel.
117. No HNP operating experience has been identified for fouling of steam generator tubes. The absence of fouling is considered largely due to the plant water chemistry program. Therefore, Reduction of Heat Transfer has been identified as an aging effect that is managed by water chemistry.
118. This component has been screened and found to be not susceptible to thermal aging embrittlement based on the information provided in a letter from C.I. Grimes (USNRC) to D. Walters (NEI), License Renewal Issue No. 98-0030, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components," May 19, 2000.
119. The Pressurizer spray head is fabricated from A296 CF8M.

120. The Feedwater Nozzle Thermal Sleeves are welded directly to the Feedwater Distribution Ring; therefore, the Feedwater Nozzle Thermal Sleeves have a "structural integrity" intended function. Since the thermal sleeve is not required for secondary side pressure boundary, the M-1 Pressure Boundary intended function does not apply.
121. The Auxiliary (Feedwater) Nozzle Thermal Sleeves are welded directly to the Internal Spray Pipe. The Auxiliary Nozzle Thermal Sleeves are internal to the Steam Generator and, therefore, are not required for maintaining the secondary side pressure boundary; however, these components are required to deliver flow in support of the Steam Generator 10 CFR 54.4(a)(1) and (a)(3) system intended functions. Therefore, these components have been assigned an M-1 Pressure Boundary intended function. The M-1 function subsumes the M-4 structural integrity intended function; therefore, the M-4 function is not required.
122. The Feedwater Distribution Ring Spray Nozzles have a "structural integrity" intended function only. The M-8 Spray function is not required to support the system intended functions.
123. The Internal Spray Pipes are internal to the Steam Generators and, therefore, are not required for maintaining the secondary side pressure boundary; however, these components are required to deliver flow in support of the Steam Generator 10 CFR 54.4(a)(1) and (a)(3) system intended functions. Therefore, these components have been assigned an M-1 Pressure Boundary intended function and an M-8 Spray intended function. The M-1 function subsumes the M-4 structural integrity intended function; therefore, the M-4 function is not required.
124. The Pressurizer Spray Nozzle, Safety Nozzles, and Relief Nozzle have inconel safe end welds. However, the inconel welds for these nozzles are clad internally by stainless steel and thus are not in direct contact with reactor coolant.
125. The Pressurizer Surge Nozzle has inconel safe end weld material which is in contact with reactor coolant.

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3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

3.2.1 INTRODUCTION

Section 3.2 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.3.2, Engineered Safety Features, subject to aging management review, with the exception of the Control Room Area Ventilation System, which has been addressed with other HVAC systems in Section 3.3. The systems or portions of systems are described in the indicated subsections.

1. Containment Spray System (Subsection 2.3.2.1)

2. Containment Isolation System (As discussed in Subsection 2.3.2.2, this system contains no unique components/commodities requiring aging management review.)

3. High Head Safety Injection (HHSI) System (Subsection 2.3.2.3)

4. Low Head Safety Injection and Residual Heat Removal System (Subsection 2.3.2.4)

5. Passive Safety Injection System (Subsection 2.3.2.5)

6. Control Room Area Ventilation System (Subsection 2.3.2.6). Refer to aging management review Table 3.3.2-71.

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 that are applicable to component/commodity groups in this Section. Table 3.2.1 uses the format of Table 1 described in Section 3.0 above.

3.2.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. Subsequent OE will be reviewed and applicable OE will be updated, as required, with the amendment to the application required by 10 CFR 54.21(b). The OE review consisted of the following:

Site: HNP site-specific OE has been captured by a review of the Action Tracking database and, as appropriate, a review of the System Engineering Notebooks and System Health Reports and discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence

(Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. The site-specific OE review identified no unique or unpredicted aging effects requiring management.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified stress corrosion cracking as an aging effect requiring management for the Passive Safety Injection accumulators.

On-Going On-going review of plant-specific and industry operating experience subsequent to the date of the aging management review continues to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.2.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Engineered Safety Features area.

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation – Containment Spray System

Table 3.2.2-2 Engineered Safety Features – Summary of Aging Management Evaluation – High Head Safety Injection System

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Low Head Safety Injection System and Residual Heat Removal System

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Passive Safety Injection System

These tables use the format of Table 2 described in Section 3.0 above.

3.2.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they 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.

3.2.2.1.1 Containment Spray System

Materials

The materials of construction for the Containment Spray System components are:

- Carbon or Low Alloy Steel
- Insulation
- Stainless Steel

Environment

The Containment Spray System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Containment Spray System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Containment Spray System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.2.2.1.2 High Head Safety Injection System

Materials

The materials of construction for the High Head Safety Injection System components are:

- Carbon or Low Alloy Steel
- Insulation
- Stainless Steel

Environment

The High Head Safety Injection System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following High Head Safety Injection System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the High Head Safety Injection System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Water Chemistry Program

3.2.2.1.3 Low Head Safety Injection and Residual Heat Removal System

Materials

The materials of construction for the Low Head Safety Injection and Residual Heat Removal System components are:

- Carbon or Low Alloy Steel
- Insulation
- Stainless Steel

Environment

The Low Head Safety Injection and Residual Heat Removal System components are exposed to the following:

- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Low Head Safety Injection and Residual Heat Removal System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Low Head Safety Injection and Residual Heat Removal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.2.2.1.4 Passive Safety Injection System

Materials

The materials of construction for the Passive Safety Injection System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Passive Safety Injection System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Passive Safety Injection System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Passive Safety Injection System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Water Chemistry Program

3.2.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Engineered Safety Features, those activities are addressed in the following subsections.

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)(1). The evaluation of this TLAA is addressed separately in Section 4.3.

3.2.2.2.2 Loss of Material Due to Cladding Breach

Loss of Material due to cladding breach could occur for PWR pump casings with stainless steel cladding subjected to borated water. NRC Information Notice 94-63 alerted all holders of operating licenses or construction permits to the potential for significant damage that could result from corrosion of reactor system components caused by cracking of the stainless steel cladding. The description of the circumstances surrounding this information notice is as follows:

> During July and August 1993 the Virginia Electric Power Company discovered severe corrosion damage of the carbon steel casing of a high head safety injection pump at North Anna Unit 1. The damage was caused by cracks through the stainless steel cladding in the pump that allowed corrosive attack by the boric acid coolant. The cracks were discovered when the pump was disassembled for

maintenance and rust was observed on the otherwise shiny surface of the cladding in the discharge section of the pump.

The charging pumps at HNP are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Therefore, loss of material due to cladding breach is not applicable for HNP.

3.2.2.2.3 Loss of Material Due to Pitting and Crevice Corrosion

3.2.2.2.3.1 Internal Surfaces of Stainless Steel Containment Isolation Components

The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. If loss of material due to pitting and crevice corrosion is applicable, an appropriate aging management program is credited.

3.2.2.2.3.2 Buried Stainless Steel Components

Loss of material due to pitting and crevice corrosion is possible for stainless steel piping, piping components, and piping elements exposed to soil. The ESF Systems at HNP do not contain piping components exposed to soil. Therefore, this item is not applicable to HNP.

3.2.2.2.3.3 BWR Stainless Steel and Aluminum Piping

Loss of material for BWR piping components is applicable to BWR plants only.

3.2.2.2.3.4 Stainless Steel and Copper Alloy Piping Components in Lubricating Oil

Loss of material from pitting and crevice corrosion could occur for stainless steel, and copper alloy piping, piping components, and piping elements exposed to lubricating oil. The applicable HNP components exposed to lubricating oil are associated with the Charging and Safety Injection Pumps. The Charging and Safety Injection Pump subcomponents exposed to lubricating oil are evaluated in the Chemical and Volume Control System (CVCS) in Subsection 3.3.2.1.1 and Table 3.3.2-1.

3.2.2.2.3.5 Bottom Surfaces of Stainless Steel Tanks

Loss of material due to pitting, crevice, and microbiologically-influenced corrosion (MIC) could occur for stainless steel tank bottoms exposed to raw water. The Refueling Water Storage Tank (RWST) is located in the Tank Area/Building described in Subsection 2.4.2.26. The RWST rests on a concrete pad. This is not a partially-encased tank with a moisture barrier as described in NUREG-1801. However, the RWST enclosure is subject to radiochemistry controls; therefore, it is not automatically drained. This could result in rainwater pool levels in the tank area exceeding the top of the 6 in. tank pad. Therefore, it is expected that rainwater (raw water) could seep into the gap below the tank bottom. Loss of material will be managed by the One-Time Inspection Program. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.2.2.2.3.6 Stainless Steel Components Exposed to Internal Condensation

This subsection discusses the potential for loss of material on the internal surfaces of piping components due to condensation in Emergency Core Cooling and Containment Spray Systems. The HNP Engineered Safety Features Systems do not contain this material and environment combination.

3.2.2.2.4 Reduction of Heat Transfer Due to Fouling

3.2.2.2.4.1 Fouling of Heat Exchanger Tubes Exposed to Lubricating Oil

Reduction of heat transfer due to fouling could occur for steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil. The Charging and Safety Injection Pumps Gear Oil Cooler Tubes in the CVCS have been aligned to this item based on material, environment, aging effect, and program. The CVCS is evaluated in Subsection 3.3.2.1.1 and Table 3.3.2-1. HNP manages heat exchanger tubes exposed to lubricating oil with the Lubricating Oil Analysis Program in combination with the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to reduction of heat transfer due to fouling. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.2.2.2.4.2 Fouling of Heat Exchanger Tubes Exposed to Treated Water

HNP manages reduction of heat transfer due to fouling for the Residual Heat Removal heat exchanger and seal water cooler tubes with the Water Chemistry Program together with the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the mitigation or reduction of heat transfer due to fouling. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.2.2.2.5 Hardening and Loss of Strength Due to Elastomer Degradation in a BWR Standby Gas Treatment System

Hardening and loss of strength due to elastomer degradation in elastomer seals associated with the BWR Standby Gas Treatment System ductwork and filters are applicable to BWR plants only.

3.2.2.2.6 Loss of Material Due to Erosion

Loss of material due to erosion could occur in the stainless steel high pressure safety injection pump miniflow recirculation orifices exposed to treated borated water. HNP manages loss of material due to erosion of the stainless steel high pressure safety injection (HPSI) pump miniflow recirculation orifices with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. These components are addressed in the CVCS which is evaluated in Subsection 3.3.2.1.1 and Table 3.3.2-1. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.2.2.2.7 Loss of Material Due to General Corrosion and Fouling

Loss of material due to general corrosion and fouling for BWR steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces is applicable to BWR plants only.

3.2.2.2.8 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.2.2.2.8.1 BWR Piping Exposed to Treated Water

Loss of material due to general, pitting, and crevice corrosion for BWR steel piping components exposed to treated water is applicable to BWR plants only.

3.2.2.2.8.2 Internal Surfaces of Containment Isolation Components

Loss of material due to general, pitting, and crevice corrosion is possible for the internal surfaces of containment isolation piping, piping components, and piping elements exposed to treated water. The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. If loss of material due to pitting and crevice corrosion is applicable, an appropriate aging management program is credited. Refer to Subsection 2.3.2.2.

3.2.2.2.8.3 Steel Piping Components Exposed to Lubricating Oil

Loss of material due to general, pitting, and crevice corrosion could occur for steel piping, piping components, and piping elements exposed to lubricating oil. Although the

ESF Systems at HNP do not contain steel piping components exposed to lubricating oil, HNP manages RCP Oil Cooler/Heat Exchanger components exposed to lubricating oil with a combination of the Lubricating Oil Analysis and One-Time Inspection Programs. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.2.2.2.9 Loss of Material Due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion (MIC)

Loss of material due to general, pitting, crevice, and MIC could occur for steel piping, piping components, and piping elements buried in soil regardless of the presence pipe coating or wrapping. The ESF Systems at HNP do not contain piping components exposed to soil. Therefore, this item is not applicable to HNP.

3.2.2.2.10 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.2.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the ESF systems components. The subsection of the application that contains the TLAA review results is indicated in parenthesis.

1. Cumulative Fatigue Damage (Section 4.3, Metal Fatigue)
2. Cumulative Fatigue Damage (Section 4.7.4, High Energy Line Break Location Postulation Based on Fatigue Cumulative Usage Factor)

3.2.3 CONCLUSIONS

The Engineered Safety Features components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Engineered Safety Features components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.2.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-01	Steel and stainless steel piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA in Section 4.3. Further evaluation is documented in Subsection 3.2.2.2.1.
3.2.1-02	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material/ cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 9463, "Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify that plant-specific program addresses cladding breach	This item is not applicable. The charging pumps at HNP are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Further evaluation is documented in Subsection 3.2.2.2.2.
3.2.1-03	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	The internal surfaces of containment isolation piping and components exposed to treated water are evaluated with their parent system. Further evaluation is documented in Subsection 3.2.2.2.3.1.
3.2.1-04	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable as documented in Subsection 3.2.2.2.3.2.
3.2.1-05	BWR Only				

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-06	Stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is applicable to subcomponents of the Charging and Safety Injection Pumps. These subcomponents are evaluated in the Chemical and Volume Control System. Further evaluation is documented in Subsection 3.2.2.2.3.4.
3.2.1-07	Partially encased stainless steel tanks with breached moisture barrier exposed to raw water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottoms because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant specific	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion could occur for the bottom surface of the stainless steel Refueling Water Storage Tank located in the Tank Area/Building. Further evaluation is documented in Subsection 3.2.2.2.3.5.
3.2.1-08	Stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This material and environment combination is not applicable. Further evaluation is documented in Subsection 3.2.2.2.3.6.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-09	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The Charging and Safety Injection Pumps Gear Oil Cooler Tubes in the Chemical and Volume Control System have been aligned to this item based on material, environment, aging effect, and program. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.2.2.2.4.1.
3.2.1-10	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages reduction of heat transfer due to fouling with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.2.2.2.4.2.
3.2.1-11	BWR Only				
3.2.1-12	Stainless steel high-pressure safety injection (charging) pump miniflow orifice exposed to treated borated water	Loss of material due to erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging.	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.2.2.2.6.
3.2.1-13	BWR Only				

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-14	BWR Only				
3.2.1-15	Steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Containment isolation piping and components internal surfaces exposed to treated water are evaluated with their parent system. Further evaluation is documented in Subsection 3.2.2.2.8.2.
3.2.1-16	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. Although the Engineered Safety Features Systems at HNP do not contain steel piping components exposed to lubricating oil, HNP manages RCP Oil Cooler/Heat Exchanger components with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.2.2.2.8.3.
3.2.1-17	Steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	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	This item is not applicable as documented in Subsection 3.2.2.2.9.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-18	BWR Only				
3.2.1-19	BWR Only				
3.2.1-20	BWR Only				
3.2.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable. The Engineered Safety Features Systems at HNP do not contain high-strength steel closure bolting.
3.2.1-22	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	The HNP AMR methodology for steel (surface temperature <212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See Item Number 3.2.1-23.
3.2.1-23	Steel bolting and closure bolting exposed to air – outdoor (external), or air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Bolting Integrity Program. The exception involves differences from the NUREG-1801 recommendations for the Bolting Integrity Program implementation.
3.2.1-24	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Bolting Integrity Program. The exception involves differences from the NUREG-1801 recommendations for the Bolting Integrity Program implementation.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-25	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.
3.2.1-26	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-27	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.
3.2.1-28	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-29	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-30	Stainless steel and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.
3.2.1-31	External surfaces of steel components including ducting, piping, ducting closure bolting, and containment isolation piping external surfaces exposed to air - indoor uncontrolled (external); condensation (external) and air - outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-32	Steel piping and ducting components and internal surfaces exposed to air – indoor uncontrolled (Internal)	Loss of material due to general corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	No AMR line items roll up to this item; therefore, it is not applicable.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-33	Steel encapsulation components exposed to air-indoor uncontrolled (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to Engineered Safety Features Systems. The valve chambers (steel encapsulation components) are treated as structural commodities (included with Penetration Sleeves) for the purposes of AMR. See Item Number 3.5.1-18.
3.2.1-34	Steel piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	NUREG-1800 and NUREG-1801 incorrectly identify this Item Number as applicable to BWRs and PWRs. Only Unique Item V.D2-17 is associated with this row.
3.2.1-35	Steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologicall y-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable. The internal surfaces of containment isolation piping and components exposed to raw water are evaluated with their parent system.
3.2.1-36	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologicall y-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-37	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-38	Stainless steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable. The internal surfaces of containment isolation piping and components exposed to raw water are evaluated with their parent system.
3.2.1-39	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-40	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	No AMR line items roll up to this item; therefore, it is not applicable.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-41	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-42	Gray cast iron piping, piping components, piping elements exposed to closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Gray cast iron components in the ESF Systems are not exposed to closed-cycle cooling water. Therefore, this item is not applicable.
3.2.1-43	Gray cast iron piping, piping components, and piping elements exposed to soil	Loss of material due to selective leaching	Selective Leaching of Materials	No	Gray cast iron components in the ESF Systems are not exposed to soil. Therefore, this item is not applicable.
3.2.1-44	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Motor cooler components in the ESF Systems are not exposed to treated water. Therefore, this item is not applicable.
3.2.1-45	Aluminum, copper alloy >15% Zn, and steel external surfaces, bolting, and piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-46	Steel encapsulation components exposed to air with borated water leakage (internal)	Loss of material due to general, pitting, crevice and boric acid corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to ESF Systems. The valve chambers (steel encapsulation components) are treated as structural commodities (included with Penetration Sleeves) for the purposes of AMR. See Item Numbers 3.5.1-18 and 3.5.1-55.
3.2.1-47	Cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	Cast austenitic stainless steel piping components in ESF Systems are not exposed to temperatures greater than >250°C (>482°F). Using the HNP AMR methodology, loss of fracture toughness due to thermal aging embrittlement was not identified as an applicable aging effect. Therefore, this item is not applicable.
3.2.1-48	Stainless steel or stainless-steel-clad steel piping, piping components, piping elements, and tanks (including safety injection tanks/accumulators) exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.2.1-49	Stainless steel piping, piping components, piping elements, and tanks exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-50	Aluminum piping, piping components, and piping elements exposed to air-indoor uncontrolled (internal/external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-51	Galvanized steel ducting exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-52	Glass piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water	None	None	NA - No AEM or AMP	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-53	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-54	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	No AMR line items roll up to this item; therefore, it is not applicable.
3.2.1-55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	No AMR line items roll up to this item; therefore, it is not applicable.

TABLE 3.2.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER V OF NUREG-1801 FOR ENGINEERED SAFETY FEATURES

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1-56	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-57	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.2.2-1 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)		F
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)		F, 202
Containment Isolation Piping and Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.A-28 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Spray Additive Tank	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A, 203
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Containment Spray Nozzles	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	V.F-13 (EP-1 9)	3.2.1-57	A
			Air - Indoor	None	None	V.F-13	3.2.1-57	A
	M-8	Stainless Steel	Air - Indoor (Inside)	None	None	V.F-13 (EP-1 9)	3.2.1-57	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Containment Spray Pumps	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.A-28 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.A-28 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 201

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	V.F-18 (EP-7)	3.2.1-56	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			H, 213
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 212
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.A-4 (E-28)	3.2.1-45	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)	3.3.1-02	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.A-28 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A

TABLE 3.2.2-1 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
			Air - Outdoor (Outside)	None	None	V.F-13 (EP-19)		G, 204
Refueling Water Storage Tank	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.A-27 (EP-41)	3.2.1-49	A
			Air - Outdoor (Outside)	None	None	V.F-13 (EP-19)		G
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	One-Time Inspection	V.D1-15 (E-01)	3.2.1-07	E, 214

TABLE 3.2.2-2 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – HIGH HEAD SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)		F
Containment Isolation Piping and Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-2 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – HIGH HEAD SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 201

TABLE 3.2.2-2 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – HIGH HEAD SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	V.F-18 (EP-7)	3.2.1-56	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 212
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1 -1 (E-28)	3.2.1-45	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-3 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)		F
Containment Isolation Piping and Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 201

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A
RHR Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A, 205, 211
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-6 (E-17)	3.2.1-27	B, 205, 211

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RHR Heat Exchanger Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 205, 211, 212
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1 -1 (E-28)	3.2.1-45	A, 205, 211
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A, 206, 211
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A, 206, 211
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A, 211
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-4 (E-19)	3.2.1-28	B, 207, 211
				Cracking due to SCC	Closed-Cycle Cooling Water System	V.D1-23 (EP-44)	3.2.1-25	B, 207, 211

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RHR Heat Exchanger Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C, 211
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	V.D1-9 (EP-35)	3.2.1-30	B, 211
RHR Pump Seal Water Cooler Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A, 208, 211
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-6 (E-17)	3.2.1-27	B, 208, 211
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 208, 211, 212
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1 -1 (E-28)	3.2.1-45	A, 208, 211

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RHR Pump Seal Water Cooler Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A, 209, 211
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A, 209, 211
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A, 211
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-4 (E-19)	3.2.1-28	B, 210, 211
				Cracking due to SCC	Closed-Cycle Cooling Water System	V.D1-23 (EP-44)	3.2.1-25	B, 210, 211
RHR Pump Seal Water Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	V.A-16 (EP-34)	3.2.1-10	C, 211
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	V.D1-9 (EP-35)	3.2.1-30	B, 211

TABLE 3.2.2-3 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – LOW HEAD SAFETY INJECTION AND RESIDUAL HEAT REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RHR Pumps	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-4 ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – PASSIVE SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)	3.2.1-24	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.E-2 (E-41)	3.2.1-45	A
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	V.E-5 (EP-24)		F
Cold Leg Accumulators	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 212
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1 -1 (E-28)	3.2.1-45	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A

TABLE 3.2.2-4 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – PASSIVE SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	V.F-18 (EP-7)	3.2.1-56	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 212
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1-1 (E-28)	3.2.1-45	A
	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	V.F-15 (EP-22)	3.2.1-56	A
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

TABLE 3.2.2-4 (continued) ENGINEERED SAFETY FEATURES – SUMMARY OF AGING MANAGEMENT EVALUATION – PASSIVE SAFETY INJECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	V.F-18 (EP-7)	3.2.1-56	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 212
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	V.D1-1 (E-28)	3.2.1-45	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	V.F-15 (EP-22)	3.2.1-56	A
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry	V.D1-31 (E-12)	3.2.1-48	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	V.D1-27 (E-13)	3.2.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	V.D1-30 (EP-41)	3.2.1-49	A
			Air - Indoor (Outside)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Notes for Tables 3.2.2-1 through 3.2.2-4:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
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:

201. Insulation material includes fiberglass, felted mineral fiber, and calcium silicate/asbestos. These materials have been evaluated as having no aging effects requiring management.
202. This line item represents stainless steel closure bolting used on stainless steel piping in an outdoor-air environment. The outdoor Refueling Water Storage Tank and adjacent stainless steel Containment Spray System piping use stainless steel closure bolting.
203. A nitrogen blanket is maintained in the Containment Spray Additive Tank to ensure solution stability and to prevent degradation during long-term storage. Nitrogen is treated as a dry gas in supply piping; however, the nitrogen blanket in the tank cannot be assumed as dry. Therefore, for the aging management review, the entire internal environment for the stainless steel Containment Spray Additive Tank is assumed to be wetted by treated water. This assumption is conservative.
204. This line item represents stainless steel Containment Spray System piping adjacent to the outdoor Refueling Water Storage Tank.
205. This line item represents the carbon steel RHR Heat Exchanger shell which is wetted internally by closed-cycle cooling water (Component Cooling Water System). These components are located in the Reactor Auxiliary Building.
206. This line item represents stainless steel tube-side components of the RHR Heat Exchangers including channel heads, tube sheets and tubing wetted by borated water. See Note 211 for additional information pertaining to the treatment of tubes and tube sheets.
207. This line item represents the stainless steel tubes and tubesheets wetted by closed-cycle cooling water (Component Cooling Water System). See Note 211 for additional information pertaining to the treatment of tubes and tube sheets.

208. This line item represents the carbon steel shell-side components of the RHR Pump Seal Water Cooler which are wetted by closed-cycle cooling water (Component Cooling Water System). These components are located in the Reactor Auxiliary Building.
209. This line item represents stainless steel tube-side components (including tubing) of the RHR Pump Seal Water Coolers wetted by borated water. See Note 211 for additional information pertaining to the treatment of tubing.
210. This line item represents the stainless steel shell-side components (including tubing) of the RHR Pump Seal Water Coolers wetted by closed-cycle cooling water (Component Cooling Water System). See Note 211 for additional information pertaining to the treatment of tubing.
211. Tubing and tubesheets are exposed to two separate environments. In order to facilitate the evaluation of each environment for tubes and tube-sheets, the tube-side environment is identified as the "inside" environment and the shell-side environment is identified as the "outside" environment.
212. Humidity control is normally not assumed for the Air - Indoor and Air - Outdoor service environments. In these service environments, the HNP AMR methodology for steel (surface temperature < 212°F) always predicts general, crevice, and pitting corrosion. For PWRs, NUREG-1801 manages loss of material on the external surfaces of steel components with XI.M36, External Surfaces Monitoring Program. In some instances, NUREG-1801 lists general, crevice, and pitting corrosion as applicable aging mechanisms (AP-41); and, in other cases, only general corrosion (E-26, E-35, E-44, A-80, A-10, A-105, A-77, and S-29) is listed. The program description in Section XI of NUREG-1801 states: "This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual examination of external surfaces for evidence of material loss."
213. This line item represents the internal surface of carbon steel nitrogen supply piping to the Containment Spray Additive Tank. A nitrogen blanket is maintained which prevents degradation during long-term storage. Although corrosion is not expected, a one-time inspection has been assigned to verify the aging effect is not occurring.
214. This line item represents corrosion resulting from water seepage underneath the RWST. The tank area enclosure for the RWST does not drain automatically. Therefore standing rainwater may accumulate to levels above the tank pad elevation.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

Section 3.3 provides the results of the aging management reviews (AMRs) for those mechanical components identified in Subsection 2.3.3, Auxiliary Systems. The systems or portions of systems are described in the indicated subsections.

1. Chemical and Volume Control System (Subsection 2.3.3.1)
2. Boron Thermal Regeneration System (Subsection 2.3.3.2)
3. Primary Makeup System (Subsection 2.3.3.3)
4. Primary Sampling System (Subsection 2.3.3.4)
5. Post-Accident Sampling System (Subsection 2.3.3.5)
6. Circulating Water System (Subsection 2.3.3.6)
7. Cooling Tower System (Subsection 2.3.3.7)
8. Cooling Tower Make-Up System (Subsection 2.3.3.8)
9. Screen Wash System (Subsection 2.3.3.9)
10. Main Reservoir Auxiliary Equipment (As discussed in Subsection 2.3.3.10, this system contains no mechanical components/commodities requiring aging management review.)
11. Auxiliary Reservoir Auxiliary Equipment (As discussed in Subsection 2.3.3.11, this system contains no mechanical components/commodities requiring aging management review.)
12. Normal Service Water System (Subsection 2.3.3.12)
13. Emergency Service Water System (Subsection 2.3.3.13)
14. Component Cooling Water System (Subsection 2.3.3.14)
15. Waste Processing Building Cooling Water System (Subsection 2.3.3.15)
16. Essential Services Chilled Water System (Subsection 2.3.3.16)
17. Non-Essential Services Chilled Water System (Subsection 2.3.3.17)

18. Emergency Screen Wash System (Subsection 2.3.3.18)

19. Generator Gas System (As discussed in Subsection 2.3.3.19, this system contains no mechanical components/commodities requiring aging management review.)

20. Hydrogen Seal Oil System (As discussed in Subsection 2.3.3.20, this system contains no mechanical components/commodities requiring aging management review.)

21. Emergency Diesel Generator System (Subsection 2.3.3.21)

22. Diesel Generator Fuel Oil Storage and Transfer System (Subsection 2.3.3.22)

23. Diesel Generator Lubrication System (Subsection 2.3.3.23)

24. Diesel Generator Cooling Water System (Subsection 2.3.3.24)

25. Diesel Generator Air Starting System (Subsection 2.3.3.25)

26. Security Power System (Subsection 2.3.3.26)

27. Instrument Air System (Subsection 2.3.3.27)

28. Service Air System (Subsection 2.3.3.28)

29. Bulk Nitrogen Storage System (Subsection 2.3.3.29)

30. Hydrogen Gas System (Subsection 2.3.3.30)

31. Fire Protection System (Subsection 2.3.3.31)

32. Storm Drains System (Subsection 2.3.3.32)

33. Oily Drains System (Subsection 2.3.3.33)

34. Radioactive Floor Drains System (Subsection 2.3.3.34)

35. Radioactive Equipment Drains System (Subsection 2.3.3.35)

36. Secondary Waste System (Subsection 2.3.3.36)

37. Laundry and Hot Shower System (Subsection 2.3.3.37)

38. Upflow Filter System (Subsection 2.3.3.38)

39. Potable and Sanitary Water System (Subsection 2.3.3.39)

40. Demineralized Water System (Subsection 2.3.3.40)

41. Filter Backwash System (Subsection 2.3.3.41)

42. Radiation Monitoring System (Subsection 2.3.3.42)

43. Oily Waste Collection and Separation System (Subsection 2.3.3.43)

44. Liquid Waste Processing System (Subsection 2.3.3.44)

45. Secondary Waste Treatment System (Subsection 2.3.3.45)

46. Boron Recycle System (Subsection 2.3.3.46)

47. Gaseous Waste Processing System (Subsection 2.3.3.47)

48. Radwaste Sampling System (Subsection 2.3.3.48)

49. Refueling System (Subsection 2.3.3.49)

50. New Fuel Handling System (As discussed in Subsection 2.3.3.50, this system contains no mechanical components/commodities requiring aging management review.)

51. Spent Fuel System (As discussed in Subsection 2.3.3.51, this system contains no mechanical components/commodities requiring aging management review.)

52. Spent Fuel Pool Cooling System (Subsection 2.3.3.52)

53. Spent Fuel Pool Cleanup System (Subsection 2.3.3.53)

54. Spent Fuel Cask Decontamination and Spray system (Subsection 2.3.3.54)

55. Spent Resin Storage and Transfer System (Subsection 2.3.3.55)

56. Containment Auxiliary Equipment (Subsection 2.3.3.56)

57. Containment Liner Penetration Auxiliary Equipment (Subsection 2.3.3.57)

58. Security Building HVAC System (Subsection 2.3.3.58)

59. Containment Vacuum Relief System (Subsection 2.3.3.59)

60. Bridge Crane Equipment (As discussed in Subsection 2.3.3.60, this system contains no mechanical components/commodities requiring aging management review.)

61. Containment Pressurization System (Subsection 2.3.3.61)

62. Penetration Pressurization System (Subsection 2.3.3.62)

63. Containment Cooling System (Subsection 2.3.3.63)

64. Airborne Radioactivity Removal System (Subsection 2.3.3.64)

65. Containment Atmosphere Purge Exhaust System (Subsection 2.3.3.65)

66. Control Rod Drive Mechanism Ventilation System (Subsection 2.3.3.66)

67. Primary Shield and Reactor Supports Cooling System (Subsection 2.3.3.67)

68. Fuel Cask Handling Crane System (As discussed in Subsection 2.3.3.68, this system contains no mechanical components/commodities requiring aging management review.)

69. Reactor Auxiliary Building Ventilation System (Subsection 2.3.3.69)

70. Emergency Service Water Intake Structure Ventilation System (Subsection 2.3.3.70)

71. Turbine Building Area Ventilation System (Subsection 2.3.3.71)

72. Waste Processing Building HVAC System (Subsection 2.3.3.72)

73. Diesel Generator Building Ventilation System (Subsection 2.3.3.73)

74. Fuel Oil Transfer Pump House Ventilation System (Subsection 2.3.3.74)

75. Fuel Handling Building Auxiliary Equipment (This system contains no mechanical components/commodities requiring aging management review as discussed in Subsection 2.3.3.75.)

76. Fuel Handling Building HVAC System (Subsection 2.3.3.76)

77. Turbine Building Health Physics Room Auxiliary Equipment (As discussed in Subsection 2.3.3.77, this system contains no mechanical components/ commodities requiring aging management review.)

78. Polar Crane Auxiliary Equipment (As discussed in Subsection 2.3.3.78, this system contains no mechanical components/commodities requiring aging management review.)

79. Elevator System (As discussed in Subsection 2.3.3.79, this system contains no mechanical components/commodities requiring aging management review.)

80. Technical Support Center HVAC System (Subsection 2.3.3.80)

81. Mechanical Components in Electrical Systems (Subsection 2.3.3.81)

82. Monorail Hoists Equipment (As discussed in Subsection 2.3.3.82, this system contains no mechanical components/commodities requiring aging management review.)

83. Post-Accident Hydrogen System (Subsection 2.3.3.83)

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 that are applicable to component/commodity groups in this Section. Table 3.3.1 uses the format of Table 1 described in Section 3.0 above.

3.3.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. Subsequent OE will be reviewed and applicable OE will be updated, as required, with the amendment to the application required by 10 CFR 54.21(b). The OE review consisted of the following:

Site: HNP site-specific OE has been captured by a review of the Action Tracking database and, as appropriate, a review of the System Engineering Notebooks and System Health Reports and discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. The review of site OE identified the following aging effects requiring management: (1) erosion due to particulate contamination in the lubricating oil of charging and safety injection pumps, (2) erosion and pitting and crevice corrosion of carbon steel components in raw water systems, (3) flow blockage of raw water piping owing to silt buildup, (4) loss of flow due to corrosion products in carbon steel components containing raw water, and (5) flow blockage due to dust buildup on ventilation system flow straighteners.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified cracking in stainless steel sample tubing as a potential aging effect. This resulted in application of a one-time inspection to assure cracking was not occurring in RCS sampling systems.

On-Going On-going review of plant-specific and industry operating experience subsequent to the date of the aging management review continues to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.3.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Auxiliary Systems area.

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Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Boron Thermal Regeneration System

Table 3.3.2-3 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Makeup System

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Table 3.3.2-31 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Equipment Drains System

Table 3.3.2-32 Auxiliary Systems – Summary of Aging Management Evaluation – Secondary Waste System

Table 3.3.2-33 Auxiliary Systems – Summary of Aging Management Evaluation – Laundry and Hot Shower System

Table 3.3.2-34 Auxiliary Systems – Summary of Aging Management Evaluation – Upflow Filter System

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Table 3.3.2-37 Auxiliary Systems – Summary of Aging Management Evaluation – Filter Backwash System

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Table 3.3.2-50 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Auxiliary Equipment

Table 3.3.2-51 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Liner Penetration Auxiliary Equipment

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Table 3.3.2-53 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Vacuum Relief System

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Table 3.3.2-55 Auxiliary Systems – Summary of Aging Management Evaluation – Penetration Pressurization System

Table 3.3.2-56 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Cooling System

Table 3.3.2-57 Auxiliary Systems – Summary of Aging Management Evaluation – Airborne Radioactivity Removal System

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Table 3.3.2-59 Auxiliary Systems – Summary of Aging Management Evaluation – Control Rod Drive Mechanism Ventilation System

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Table 3.3.2-63 Auxiliary Systems – Summary of Aging Management Evaluation – Turbine Building Area Ventilation System

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Table 3.3.2-65 Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Building Ventilation System

Table 3.3.2-66 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Oil Transfer Pump House Ventilation System

Table 3.3.2-67 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System

Table 3.3.2-68 Auxiliary Systems – Summary of Aging Management Evaluation – Technical Support Center HVAC System

Table 3.3.2-69 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Components in Electrical Systems

Table 3.3.2-70 Auxiliary Systems – Summary of Aging Management Evaluation – Post-Accident Hydrogen System

Table 3.3.2-71 Auxiliary Systems – Summary of Aging Management Evaluation – Control Room Area Ventilation System

These tables use the format of Table 2 described in Section 3.0 above.

3.3.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they 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.

3.3.2.1.1 Chemical and Volume Control System

Materials

The materials of construction for the Chemical and Volume Control System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Glass
- Gray Cast Iron
- Insulation
- Stainless Steel

Environment

The Chemical and Volume Control System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Lubricating Oil or Hydraulic Fluid
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Chemical and Volume Control System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Chemical and Volume Control System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Open-Cycle Cooling Water System
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.2 Boron Thermal Regeneration System

Materials

The materials of construction for the Boron Thermal Regeneration System components are:

- Carbon or Low Alloy Steel

- Copper Alloy >15% Zn
- Glass
- Stainless Steel

Environment

The Boron Thermal Regeneration System components are exposed to the following:
- Air - Indoor
- Air/Gas (Dry)
- Lubricating Oil or Hydraulic Fluid
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Boron Thermal Regeneration System aging effects require management:
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Boron Thermal Regeneration System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.3 Primary Makeup System

Materials

The materials of construction for the Primary Makeup System components are:
- Carbon or Low Alloy Steel
- Elastomers
- Stainless Steel

Environment

The Primary Makeup System components are exposed to the following:

- Air - Indoor
- Air -Outdoor
- Treated Water

Aging Effects Requiring Management

The following Primary Makeup System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Primary Makeup System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Water Chemistry Program

3.3.2.1.4 Primary Sampling System

Materials

The materials of construction for the Primary Sampling System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Glass
- Stainless Steel

Environment

The Primary Sampling System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Primary Sampling System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Primary Sampling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.5 Post-Accident Sampling System

Materials

The materials of construction for the Post Accident Sampling System components are:

- Insulation
- Stainless Steel

Environment

The Post Accident Sampling System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Post Accident Sampling System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Post Accident Sampling System components:

- Bolting Integrity Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.6 Circulating Water System

Materials

The materials of construction for the Circulating Water System components are:

- Carbon or Low Alloy Steel
- Elastomers
- Stainless Steel

Environment

The Circulating Water System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following Circulating Water System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Circulating Water System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.7 Cooling Tower System

Materials

The materials of construction for the Cooling Tower System components are:

- Carbon or Low Alloy Steel
- Fiber Glass or Fiber Reinforced Plastic
- Gray Cast Iron
- PVC or Thermoplastics

Environment

The Cooling Tower System components are exposed to the following:

- Raw Water
- Soil

Aging Effects Requiring Management

The following Cooling Tower System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Cooling Tower System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.8 Cooling Tower Make-Up System

Materials

The materials of construction for the Cooling Tower Make-Up System components are:

- Carbon or Low Alloy Steel

Environment

The Cooling Tower Make-Up System components are exposed to the following:

- Air - Outdoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following Cooling Tower Make-Up System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Cooling Tower Make-Up System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.9 Screen Wash System

Materials

The materials of construction for the Screen Wash System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Screen Wash System components are exposed to the following:

- Air - Indoor
- Raw Water

Aging Effects Requiring Management

The following Screen Wash System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Screen Wash System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.10 Normal Service Water System

Materials

The materials of construction for the Normal Service Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Normal Service Water System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Raw Water
- Soil

Aging Effects Requiring Management

The following Normal Service Water System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Normal Service Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

3.3.2.1.11 Emergency Service Water System

Materials

The materials of construction for the Emergency Service Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Insulation
- Stainless Steel

Environment

The Emergency Service Water System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Raw Water
- Soil

Aging Effects Requiring Management

The following Emergency Service Water System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Service Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Open-Cycle Cooling Water System Program

3.3.2.1.12 Component Cooling Water System

Materials

The materials of construction for the Component Cooling Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Glass
- Insulation
- Stainless Steel

Environment

The Component Cooling Water System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Component Cooling Water System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction in Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Component Cooling Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Open-Cycle Cooling Water System Program

3.3.2.1.13 Waste Processing Building Cooling Water System

Materials

The materials of construction for the Waste Processing Building Cooling Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn

Environment

The Waste Processing Building Cooling Water System components are exposed to the following:

- Air - Indoor
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Waste Processing Building Cooling Water System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Waste Processing Building Cooling Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.14 Essential Services Chilled Water System

Materials

The materials of construction for the Essential Services Chilled Water System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Glass
- Stainless Steel

Environment

The Essential Services Chilled Water System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Lubricating Oil or Hydraulic Fluid
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Essential Services Chilled Water System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Essential Services Chilled Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Open-Cycle Cooling Water System
- Selective Leaching of Materials Program

3.3.2.1.15 Non-Essential Services Chilled Water System

Materials

The materials of construction for the Non-Essential Services Chilled Water System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Non-Essential Services Chilled Water System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Non-Essential Services Chilled Water System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Non-Essential Services Chilled Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program

3.3.2.1.16 Emergency Screen Wash System

Materials

The materials of construction for the Emergency Screen Wash System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Insulation
- Stainless Steel

Environment

The Emergency Screen Wash System components are exposed to the following:

- Air - Indoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following Emergency Screen Wash System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Screen Wash System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

3.3.2.1.17 Emergency Diesel Generator System

Materials

The materials of construction for the Emergency Diesel Generator System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel

- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Emergency Diesel Generator System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Diesel Exhaust
- Lubricating Oil or Hydraulic Fluid
- Treated Water

Aging Effects Requiring Management

The following Emergency Diesel Generator System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Diesel Generator System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.18 Diesel Generator Fuel Oil Storage and Transfer System

Materials

The materials of construction for the Diesel Generator Fuel Oil Storage and Transfer System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Diesel Generator Fuel Oil Storage and Transfer System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)
- Fuel Oil
- Soil

Aging Effects Requiring Management

The following Diesel Generator Fuel Oil Storage and Transfer System aging effects require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Fuel Oil Storage and Transfer System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Fuel Oil Chemistry Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program

3.3.2.1.19 Diesel Generator Lubrication System

Materials

The materials of construction for the Diesel Generator Lubrication System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Glass
- Stainless Steel

Environment

The Diesel Generator Lubrication System components are exposed to the following:

- Air - Indoor
- Lubricating Oil or Hydraulic Fluid
- Treated Water

Aging Effects Requiring Management

The following Diesel Generator Lubrication System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Lubrication System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program

3.3.2.1.20 Diesel Generator Cooling Water System

Materials

The materials of construction for the Diesel Generator Cooling Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Diesel Generator Cooling Water System components are exposed to the following:

- Air - Indoor
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Diesel Generator Cooling Water System aging effects require management:

- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Cooling Water System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

3.3.2.1.21 Diesel Generator Air Starting System

Materials

The materials of construction for the Diesel Generator Air Starting System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Glass
- Stainless Steel

Environment

The Diesel Generator Air Starting System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Diesel Generator Air Starting System aging effects require management:

- Cracking

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Air Starting System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.22 Security Power System

Materials

The materials of construction for the Security Power System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Fiber Glass or Fiber Reinforced Plastic
- Gray Cast Iron
- PVC or Thermoplastics
- Stainless Steel

Environment

The Security Power System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)
- Concrete
- Diesel Exhaust
- Fuel Oil
- Lubricating Oil or Hydraulic Fluid
- Soil
- Treated Water

Aging Effects Requiring Management

The following Security Power System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Security Power System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Fuel Oil Chemistry Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.23 Instrument Air System

Materials

The materials of construction for the Instrument Air System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Instrument Air System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)

Aging Effects Requiring Management

The following Instrument Air System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Instrument Air System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.24 Service Air System

Materials

The materials of construction for the Service Air System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Service Air System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)

Aging Effects Requiring Management

The following Service Air System aging effects require management:

- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Service Air System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.25 Bulk Nitrogen Storage System

Materials

The materials of construction for the Bulk Nitrogen Storage System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Bulk Nitrogen Storage System components are exposed to the following:
- Air - Indoor
- Air/Gas (Dry)

Aging Effects Requiring Management

The following Bulk Nitrogen Storage System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Bulk Nitrogen Storage System components:
- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.26 Hydrogen Gas System

Materials

The materials of construction for the Hydrogen Gas System components are:
- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Hydrogen Gas System components are exposed to the following:
- Air - Indoor
- Air/Gas (Dry)

Aging Effects Requiring Management

The following Hydrogen Gas System aging effects require management:
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Hydrogen Gas System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.27 Fire Protection System

Materials

The materials of construction for the Fire Protection System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Glass
- Gray Cast Iron
- PVC or Thermoplastics
- Stainless Steel

Environment

The Fire Protection System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)
- Diesel Exhaust
- Fuel Oil
- Lubricating Oil or Hydraulic Fluid
- Raw Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following Fire Protection System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Fire Protection System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Fire Protection Program
- Fire Water System Program
- Fuel Oil Chemistry Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.28 Storm Drain System

Materials

The materials of construction for the Storm Drain System components are:

- Carbon or Low Alloy Steel

Environment

The Storm Drain System components are exposed to the following:

- Air - Indoor
- Raw Water

Aging Effects Requiring Management

The following Storm Drain System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Storm Drain System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.29 Oily Drains System

Materials

The materials of construction for the Oily Drains System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron

Environment

The Oily Drains System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Oily Drains System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Oily Drains System components:

- Bolting Integrity Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.30 Radioactive Floor Drains System

Materials

The materials of construction for the Radioactive Floor Drains System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Radioactive Floor Drains System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Concrete
- Raw Water

Aging Effects Requiring Management

The following Radioactive Floor Drains System aging effects require management:

- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Radioactive Floor Drains System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.31 Radioactive Equipment Drains System

Materials

The materials of construction for the Radioactive Equipment Drains System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Radioactive Equipment Drains System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Concrete
- Silicone Fluid
- Treated Water

Aging Effects Requiring Management

The following Radioactive Equipment Drains System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Radioactive Equipment Drains System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.32 Secondary Waste System

Materials

The materials of construction for the Secondary Waste System components are:

- Carbon or Low Alloy Steel
- Ceramic
- Glass
- PVC or Thermoplastics
- Stainless Steel

Environment

The Secondary Waste System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Concrete
- Lubricating Oil or Hydraulic Fluid
- Raw Water
- Soil

Aging Effects Requiring Management

The following Secondary Waste System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Secondary Waste System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Buried Piping and Tanks Inspection Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program

3.3.2.1.33 Laundry and Hot Shower System

Materials

The materials of construction for the Laundry and Hot Shower System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Laundry and Hot Shower System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Raw Water

Aging Effects Requiring Management

The following Laundry and Hot Shower System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Laundry and Hot Shower System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.34 Upflow Filter System

Materials

The materials of construction for the Upflow Filter System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Upflow Filter System components are exposed to the following:
- Air - Indoor
- Raw Water

Aging Effects Requiring Management

The following Upflow Filter System aging effects require management:
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Upflow Filter System components:
- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.35 Potable and Sanitary Water System

Materials

The materials of construction for the Potable and Sanitary Water System components are:
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Gray Cast Iron
- Stainless Steel

Environment

The Potable and Sanitary Water System components are exposed to the following:
- Air - Indoor
- Air – Outdoor
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Potable and Sanitary Water System aging effects require management:
- Loss of Material

- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Potable and Sanitary Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.36 Demineralized Water System

Materials

The materials of construction for the Demineralized Water System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Demineralized Water System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Concrete
- Treated Water

Aging Effects Requiring Management

The following Demineralized Water System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Demineralized Water System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program

- External Surfaces Monitoring Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.3.2.1.37 Filter Backwash System

Materials

The materials of construction for the Filter Backwash System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Filter Backwash System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Filter Backwash System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Filter Backwash System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Water Chemistry Program

3.3.2.1.38 Radiation Monitoring System

Materials

The materials of construction for the Radiation Monitoring System components are:

- Stainless Steel

Environment

The Radiation Monitoring System components are exposed to the following:
- Air - Indoor
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Radiation Monitoring System aging effects require management:
- Cracking
- Flow Blockage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Radiation Monitoring System components:
- Closed-Cycle Cooling Water System Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.39 Oily Waste Collection and Separation System

Materials

The materials of construction for the Oily Waste Collection and Separation System components are:
- Carbon or Low Alloy Steel

Environment

The Oily Waste Collection and Separation System components are exposed to the following:
- Air - Indoor
- Air - Outdoor
- Raw Water

Aging Effects Requiring Management

The following Oily Waste Collection and Separation System aging effects require management:

- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Oily Waste Collection and Separation System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.40 Liquid Waste Processing System

Materials

The materials of construction for the Liquid Waste Processing System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Liquid Waste Processing System components are exposed to the following:

- Air - Indoor
- Raw Water

Aging Effects Requiring Management

The following Liquid Waste Processing System aging effects require management:

- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Liquid Waste Processing System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.41 Secondary Waste Treatment System

Materials

The materials of construction for the Secondary Waste Treatment System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Secondary Waste Treatment System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Raw Water

Aging Effects Requiring Management

The following Secondary Waste Treatment System aging effects require management:

- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Secondary Waste Treatment System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.42 Boron Recycle System

Materials

The materials of construction for the Boron Recycle System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Boron Recycle System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Boron Recycle System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Boron Recycle System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Water Chemistry Program

3.3.2.1.43 Gaseous Waste Processing System

Materials

The materials of construction for the Gaseous Waste Processing System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn

- Insulation
- Stainless Steel

Environment

The Gaseous Waste Processing System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Gaseous Waste Processing System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Gaseous Waste Processing System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.44 Radwaste Sampling System

Materials

The materials of construction for the Radwaste Sampling System components are:

- Stainless Steel

Environment

The Radwaste Sampling System components are exposed to the following:

- Air - Indoor
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Radwaste Sampling System aging effects require management:

- Cracking
- Flow Blockage
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Radwaste Sampling System components:

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.45 Refueling System

Materials

The materials of construction for the Refueling System components are:

- Nickel Base Alloys
- Stainless Steel

Environment

The Refueling System components are exposed to the following:

- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Refueling System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Refueling System components:

- Bolting Integrity Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.46 Spent Fuel Pool Cooling System

Materials

The materials of construction for the Spent Fuel Pool Cooling System components are:

- Carbon or Low Alloy Steel
- Insulation
- Stainless Steel

Environment

The Spent Fuel Pool Cooling System components are exposed to the following:

- Air - Indoor
- Concrete
- Treated Water

Aging Effects Requiring Management

The following Spent Fuel Pool Cooling System aging effects require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Pool Cooling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- Water Chemistry Program

3.3.2.1.47 Spent Fuel Pool Cleanup System

Materials

The materials of construction for the Spent Fuel Pool Cleanup System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Spent Fuel Pool Cleanup System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Spent Fuel Pool Cleanup System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Pool Cleanup System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Water Chemistry Program

3.3.2.1.48 Spent Fuel Cask Decontamination and Spray System

Materials

The materials of construction for the Spent Fuel Cask Decontamination and Spray System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Spent Fuel Cask Decontamination and Spray System components are exposed to the following:

- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Spent Fuel Cask Decontamination and Spray System aging effects require management:

- Loss of Material

- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Spent Fuel Cask Decontamination and Spray System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Selective Leaching of Materials Program

3.3.2.1.49 Spent Resin Storage and Transfer System

Materials

The materials of construction for the Spent Resin Storage and Transfer System components are:

- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Spent Resin Storage and Transfer System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Spent Resin Storage and Transfer System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Spent Resin Storage and Transfer System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.50 Containment Auxiliary Equipment

Materials

The materials of construction for the Containment Auxiliary Equipment components are:
- Stainless Steel

Environment

The Containment Auxiliary Equipment components are exposed to the following:
- Air - Indoor
- Silicone Fluid

Aging Effects Requiring Management

The following Containment Auxiliary Equipment aging effects require management:
- None

Aging Management Programs

The following AMPs manage the aging effects for the Containment Auxiliary Equipment components:
- None

3.3.2.1.51 Containment Liner Penetration Auxiliary Equipment

Materials

The materials of construction for the Containment Liner Penetration Auxiliary Equipment components are:
- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Containment Liner Penetration Auxiliary Equipment components are exposed to the following:

- Air - Indoor
- Raw Water

Aging Effects Requiring Management

The following Containment Liner Penetration Auxiliary Equipment aging effects require management:

- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Containment Liner Penetration Auxiliary Equipment components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Selective Leaching of Materials Program

3.3.2.1.52 Security Building HVAC System

Materials

The materials of construction for the Security Building HVAC System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Security Building HVAC System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Security Building HVAC System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Security Building HVAC System components:

- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.53 Containment Vacuum Relief System

Materials

The materials of construction for the Containment Vacuum Relief System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Containment Vacuum Relief System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Containment Vacuum Relief System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Containment Vacuum Relief System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.54 Containment Pressurization System

Materials

The materials of construction for the Containment Pressurization System components are:

- Carbon or Low Alloy Steel

Environment

The Containment Pressurization System components are exposed to the following:

- Air - Indoor

Aging Effects Requiring Management

The following Containment Pressurization System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Containment Pressurization System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.55 Penetration Pressurization System

Materials

The materials of construction for the Penetration Pressurization System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Penetration Pressurization System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Penetration Pressurization System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Penetration Pressurization System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.56 Containment Cooling System

Materials

The materials of construction for the Containment Cooling System components are:

- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Containment Cooling System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Raw Water

Aging Effects Requiring Management

The following Containment Cooling System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Containment Cooling System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Open-Cycle Cooling Water System Program

3.3.2.1.57 Airborne Radioactivity Removal System

Materials

The materials of construction for the Airborne Radioactivity Removal System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Airborne Radioactivity Removal System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Airborne Radioactivity Removal System aging effects require management:

- Change in Material Properties
- Cracking

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Airborne Radioactivity Removal System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.58 Containment Atmosphere Purge Exhaust System

Materials

The materials of construction for the Containment Atmosphere Purge Exhaust System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Containment Atmosphere Purge Exhaust System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Containment Atmosphere Purge Exhaust System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material

- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Containment Atmosphere Purge Exhaust System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.59 Control Rod Drive Mechanism Ventilation System

Materials

The materials of construction for the Control Rod Drive Mechanism Ventilation System components are:

- Carbon or Low Alloy Steel
- Elastomers
- Galvanized Steel

Environment

The Control Rod Drive Mechanism Ventilation System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Control Rod Drive Mechanism Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Control Rod Drive Mechanism Ventilation System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.60 Primary Shield and Reactor Supports Cooling System

Materials

The materials of construction for the Primary Shield and Reactor Supports Cooling System components are:

- Carbon or Low Alloy Steel
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Primary Shield and Reactor Supports Cooling System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Primary Shield and Reactor Supports Cooling System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Primary Shield and Reactor Supports Cooling System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.61 Reactor Auxiliary Building Ventilation System

Materials

The materials of construction for the Reactor Auxiliary Building Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Reactor Auxiliary Building Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Reactor Auxiliary Building Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Auxiliary Building Ventilation System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.62 Emergency Service Water Intake Structure Ventilation System

Materials

The materials of construction for the Emergency Service Water Intake Structure Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Emergency Service Water Intake Structure Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Emergency Service Water Intake Structure Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Service Water Intake Structure Ventilation System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.63 Turbine Building Area Ventilation System

Materials

The materials of construction for the Turbine Building Area Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Turbine Building Area Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Turbine Building Area Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Turbine Building Area Ventilation System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.64 Waste Processing Building HVAC System

Materials

The materials of construction for the Waste Processing Building HVAC System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Waste Processing Building HVAC System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Waste Processing Building HVAC System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Waste Processing Building HVAC System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.65 Diesel Generator Building Ventilation System

Materials

The materials of construction for the Diesel Generator Building Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Diesel Generator Building Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Diesel Generator Building Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Building Ventilation System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.66 Fuel Oil Transfer Pump House Ventilation System

Materials

The materials of construction for the Fuel Oil Transfer Pump House Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Fuel Oil Transfer Pump House Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Fuel Oil Transfer Pump House Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Fuel Oil Transfer Pump House Ventilation System components:

- Bolting Integrity Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.67 Fuel Handling Building HVAC System

Materials

The materials of construction for the Fuel Handling Building HVAC System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Fuel Handling Building HVAC System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Fuel Handling Building HVAC System aging effects require management:

- Change in Material Properties
- Cracking
- Flow Blockage
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Fuel Handling Building HVAC System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.68 Technical Support Center HVAC System

Materials

The materials of construction for the Technical Support Center HVAC System components are:

- Carbon or Low Alloy Steel
- Galvanized Steel

Environment

The Technical Support Center HVAC System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)

Aging Effects Requiring Management

The following Technical Support Center HVAC System aging effects require management:

- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Technical Support Center HVAC System components:

- Boric Acid Corrosion Program
- External Surfaces Monitoring Program

3.3.2.1.69 Mechanical Components in Electrical Systems

Materials

The materials of construction for the Mechanical Components in Electrical Systems components are:

230KV Switchyard System

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Gross Failed Fuel Detection System

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Mechanical Components in Electrical Systems components are exposed to the following:

230KV Switchyard System
- Air - Outdoor
- Air/Gas (Dry)
- Cable Oil

Gross Failed Fuel Detection System
- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Mechanical Components in Electrical Systems aging effects require management:

230KV Switchyard System
- Loss of Material

Gross Failed Fuel Detection System
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Mechanical Components in Electrical Systems components:

230KV Switchyard System
- External Surfaces Monitoring Program

Gross Failed Fuel Detection System
- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.3.2.1.70 Post-Accident Hydrogen System

Materials

The materials of construction for the Post-Accident Hydrogen System components are:

- Aluminum or Aluminum Alloys
- Copper Alloy >15% Zn
- Galvanized Steel
- Insulation
- Nickel Base Alloys
- Stainless Steel

Environment

The Post-Accident Hydrogen System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Post-Accident Hydrogen System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Post-Accident Hydrogen System components:

- Bolting Integrity Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.1.71 Control Room Area Ventilation System

Materials

The materials of construction for the Control Room Area Ventilation System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel

- Copper Alloy <15% Zn
- Copper Alloy >15% Zn
- Elastomers
- Galvanized Steel
- Stainless Steel

Environment

The Control Room Area Ventilation System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Control Room Area Ventilation System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Control Room Area Ventilation System components:

- Bolting Integrity Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.3.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Auxiliary Systems, those activities are addressed in the following subsections.

3.3.2.2.1 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)(1). The evaluation of the TLAAs for cranes is addressed separately in Section 4.7. The evaluation of the TLAAs for piping, piping components, piping elements, and heat exchanger components is addressed separately in Section 4.3.

3.3.2.2.2 Reduction of Heat Transfer Due to Fouling

Reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. NUREG-1800 and NUREG-1801 incorrectly identify this item as applicable to BWR and PWR nuclear power plants. However, unique items VII.A4-4 (AP-62) and VII.E3-6 (AP-62) apply to BWR plants only.

3.3.2.2.3 Cracking Due to Stress Corrosion Cracking (SCC)

3.3.2.2.3.1 SCC of BWR Standby Liquid Control System Components

Cracking of BWR Standby Liquid Control piping components is applicable to BWR plants only.

3.3.2.2.3.2 SCC of Heat Exchanger Components

NUREG-1800 and NUREG-1801 incorrectly state that this item is applicable to both PWR and BWR nuclear power plants. However, unique items VII.E3-3 (A-71) and VII.E3-19 (A-85) apply to BWR systems only, i.e., the Reactor Water Cleanup System.

3.3.2.2.3.3 SCC of Stainless Steel Diesel Exhaust Piping

Cracking due to SCC could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. The carbon steel Emergency Diesel Generator System diesel engine exhaust piping contains a stainless steel expansion joint. Cracking due to SCC of the expansion joint is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.3.2.2.4 Cracking Due to Stress Corrosion Cracking and Cyclic Loading

3.3.2.2.4.1 Cracking of PWR Non-Regenerative Heat Exchanger Components

Cracking due to SCC and cyclic loading could occur in stainless steel non-regenerative heat exchanger components exposed to treated water greater than 140°F in the Chemical and Volume Control System (CVCS). HNP manages cracking of CVCS heat exchanger components with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation. The One-Time Inspection Program is selected in lieu of radioactivity monitoring of the shell side water and eddy current testing of tubes.

This position was found acceptable to the NRC staff in NUREG-1785, Safety Evaluation Report Related to the License Renewal of H.B. Robinson Steam Electric Plant, Unit 2. Section 3.3.2.2.8 of the Safety Evaluation Report states:

> In LRA Table 3.3-1, row 8 the applicant stated that SCC is an applicable aging mechanism for the seal water, excess letdown, and regenerative heat exchangers.
>
> The applicant credited the Water Chemistry Program for managing the crack initiation and growth due to SCC in these heat exchangers and the Closed-Cycle Cooling Water System Program for managing the aging effect for heat exchangers cooled by the CCW system. To verify the effectiveness of the Water Chemistry Program in preventing cracking due to SCC, the applicant credited an inspection of small-bore Class 1 piping system and components connected to the RCS under the One-Time Inspection Program in selected locations where degradation would be expected. The applicant stated that management of SCC for this group is consistent with the GALL Report with the exception that the one-time inspection will be used instead of the eddy current testing recommended in the GALL Report. The Water Chemistry Program and the One-Time Inspection Program are evaluated in Sections 3.0.3.3 and 3.0.3.9 of this SER. The staff finds that these programs can effectively manage the cracking initiation and growth due to SCC for the above components that are applicable to RNP auxiliary systems.
>
> On the basis of its review, the staff finds that the applicant has adequately evaluated the management of crack initiation and growth due to SCC and cyclic loading for components in the auxiliary systems, as recommended in the GALL Report. On the basis of this finding, and the finding that the remainder of the

applicant's program is consistent with GALL, the staff concludes that the applicant has demonstrated that these aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation.

3.3.2.2.4.2 Cracking of PWR Regenerative Heat Exchanger Components

Cracking due to SCC and cyclic loading could occur in stainless steel regenerative heat exchanger components exposed to treated water greater than 140°F. HNP manages cracking of CVCS heat exchanger components with a combination of the Water Chemistry Program and the One-Time Inspection Program. The basis for acceptability of the aging management approach is identical to the response in Subsection 3.3.2.2.4.1 above.

3.3.2.2.4.3 Cracking of PWR Pumps in the Chemical and Volume Control System

HNP manages cracking of CVCS stainless steel pump casings with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.4.4 Cracking of High Strength Bolting Exposed to Steam or Water Leakage

Cracking of high strength closure bolting could occur for CVCS bolting exposed to steam or water leakage. 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. HNP 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.

3.3.2.2.5 <u>Hardening and Loss of Strength Due to Elastomer Degradation</u>

3.3.2.2.5.1 Degradation of Elastomer Seals and Components in HVAC Systems

Hardening and loss of strength due to elastomer degradation could occur in seals and components of HVAC systems exposed to indoor air on internal or external surfaces. HNP manages the internal surfaces of the ventilation system components with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. This program is also applied to manage similar aging effects of the diaphragm in the Boric Acid Tank that is in the CVCS. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

HNP manages the external surfaces of the ventilation system components with the External Surfaces Monitoring Program. The External Surfaces Monitoring program is based on system inspections and walkdowns. This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual inspection of external surfaces for evidence of material degradation that could result in a loss of component intended functions.

3.3.2.2.5.2 Degradation of Elastomer Linings of Components in Spent Fuel Pool Cooling and Cleanup Systems

For PWRs, unique item VII.A3-1 (A-15) is relevant. This unique item evaluates Spent Fuel Pool Cooling and Cleanup steel components with elastomer lining. HNP Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Therefore, this item is not applicable.

3.3.2.2.6 Reduction of Neutron Absorbing Capacity and Loss of Material Due to General Corrosion

Reduction of neutron absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing materials used in spent fuel storage racks exposed to treated water or treated borated water. The AMR evaluation reviewed the current HNP monitoring results for Boral testing performed and determined that negligible adverse plant-specific operating experience has been recorded. Additionally, both Virgil C. Summer Nuclear Plant and Brunswick Steam Electric Plant have been evaluated for the aging effect of "reduction of neutron-absorbing capacity" by the NRC staff. The Safety Evaluation Reports for License Renewal (NUREG-1787, for Summer, and NUREG-1856, for Brunswick) determined the aging effect to be insignificant. Therefore, it is concluded that "reduction of neutron-absorbing capacity" for Boral does not require aging management. However, the aging effect of loss of material will continue to be managed by the Water Chemistry Program.

3.3.2.2.7 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.3.2.2.7.1 Steel Components Exposed to Lubricating Oil

Loss of material due to general, pitting, and crevice corrosion could occur in steel components including the reactor coolant pump lube oil leakage collection system exposed to lubricating oil. Affected components may include piping, tubing, valves, and tanks. HNP manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation. The One-Time Inspection Program includes an inspection to determine the thickness of the lower portion of the reactor coolant pump oil collection tank.

Note: NUREG-1801 includes the Reactor Coolant Pump Oil Collection System as part of the Fire Protection System (See page VII G-6 of Volume 2, Items VII.G-26 and VII.G-27.) The Reactor Coolant Pump Oil Collection System at HNP is part of the Reactor Coolant Pump System and not the Fire Protection System.

3.3.2.2.7.2 BWR Reactor Water Cleanup and Shutdown Cooling Systems

Loss of material for BWR Reactor Water Cleanup and Shutdown Cooling System piping components exposed to treated water is applicable to BWR plants only.

3.3.2.2.7.3 Diesel Engine Exhaust System Piping

Loss of material due to general (steel only), pitting, and crevice corrosion could occur in steel and stainless steel diesel exhaust piping, piping components, and piping elements exposed to diesel exhaust. HNP manages the internal surfaces of piping components exposed to diesel exhaust with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.3.2.2.8 Loss of Material Due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion (MIC)

Loss of material due to general, pitting, crevice, and MIC could occur for steel piping, piping components, and piping elements, buried in soil regardless of the presence of pipe coatings or wrappings. HNP manages the external surfaces of piping components exposed to soil with the Buried Piping and Tanks Inspection Program. The program includes (a) preventive measures to mitigate degradation (e.g., coatings and wrappings required by design) and (b) visual inspections of external surfaces of buried piping components, when excavated, for evidence of coating damage and degradation.

3.3.2.2.9 Loss of Material Due to General, Pitting, Crevice, MIC, and Fouling

3.3.2.2.9.1 Steel Components Exposed to Fuel Oil

Loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel piping, piping components, and piping elements, and tanks exposed to fuel oil. HNP manages piping components and tanks exposed to fuel oil with a combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program. The Fuel Oil Chemistry Program maintains fuel oil quality by monitoring and controlling fuel oil contamination in accordance with the plant's Technical Specifications and the guidelines of the American Society for Testing Materials. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation. For tanks, the One-Time Inspection Program manages tank bottom surfaces as follows:

- Diesel Fuel Oil Storage Tank Building Liners - ultrasonic thickness measurements will be performed.
- Fuel Oil Day Tanks - repair and/or inspection records will be reviewed to confirm that these components have been inspected for aging degradation and that significant aging degradation has not occurred.
- Security Power Main Fuel and Day Tanks will be cleaned and visually inspected.
- Diesel Driven Fire Pump Fuel Oil Storage Tank will be cleaned and visually inspected.

3.3.2.2.9.2 Steel Heat Exchanger Components Exposed to Lubricating Oil

Loss of material due to general, pitting, crevice, MIC, and fouling could occur for steel heat exchanger components exposed to lubricating oil. HNP manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.10 Loss of Material Due to Pitting and Crevice Corrosion

3.3.2.2.10.1 Elastomer-Lined and Stainless Steel Clad Components Exposed to Treated or Treated Borated Water

For PWRs, unique item VII.A3-9 (A-39) is relevant. This unique item evaluates Spent Fuel Pool Cooling and Cleanup steel components with elastomer lining. HNP Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Therefore, this item is not applicable.

3.3.2.2.10.2 Stainless Steel, Steel with Stainless Cladding, and Aluminum Components Exposed to Treated Water

Loss of material for BWR Spent Fuel Pool Cooling and Cleanup, Reactor Water Cleanup, and Shutdown Cooling System piping components exposed to treated water is applicable to BWR plants only. NUREG-1800 incorrectly identifies this item as applicable to BWR and PWR plants. Unique items VII.A4-11, VII.E3-15, VII.E4-14, VII.A4-5, VII.E3-7, and VII.E4-4 apply only to BWR plants.

3.3.2.2.10.3 Copper Alloy HVAC Components Exposed to Condensation

For copper alloy with a zinc content of less than 15%, the HNP AMR methodology does not predict aging effects in the absence of contaminants. In the HNP ventilation systems, condensation is present but is drained away as it is formed on the cooling coil. This inhibits the concentration of contaminants.

3.3.2.2.10.4 Copper Alloy HVAC Piping Components Exposed to Lubricating Oil

Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. HNP manages piping components exposed to lubricating oil with the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.10.5 Aluminum HVAC Components and Stainless Components Exposed to Condensation

Loss of material due to pitting and crevice corrosion could occur for HVAC aluminum piping, piping components, and piping elements and stainless steel ducting and components exposed to condensation. To manage this aging effect for the bird screens in the Containment Purge System, HNP uses the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

3.3.2.2.10.6 Copper Alloy Fire Protection Piping Components Exposed to Condensation

Loss of material due to pitting and crevice corrosion could occur for copper alloy fire protection system piping, piping components, and piping elements exposed to internal condensation. HNP considers that a condensing environment has the capability to concentrate contaminants; therefore, a raw water environment was assumed for these components. HNP Fire Protection System copper alloy components exposed internally to condensation are managed by either the Fire Water System Program or the Selective Leaching of Materials Program. The Fire Water System Program includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable NFPA commitments and periodic visual inspection of overall system condition. This Selective Leaching of Materials Program includes one-time inspections and qualitative determinations of selected components that may be susceptible to selective leaching. Refer to the Fire Protection system AMR results on Table 3.3.2-27.

3.3.2.2.10.7 Stainless Steel Piping Components Exposed to Soil

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. The systems containing service water and the Fire Protection, Diesel Generator Fuel Oil Storage and Transfer System, and Emergency Diesel Generator System do not contain stainless steel components exposed to soil. Therefore, this item is not applicable to HNP.

3.3.2.2.10.8 Corrosion of BWR Standby Liquid Control System Components

Loss of material for BWR Standby Liquid Control System piping components exposed to treated water and sodium pentaborate is applicable to BWR plants only.

3.3.2.2.11 Loss of Material Due to Pitting, Crevice, and Galvanic Corrosion

This item is applicable to BWRs only. Loss of material for BWR Standby Liquid Control, Spent Fuel Pool Cooling and Cleanup, Reactor Water Cleanup, and Shutdown Cooling System copper alloy piping components exposed to treated water is applicable to BWR plants only.

3.3.2.2.12 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.3.2.2.12.1 Stainless Steel, Aluminum, and Copper Alloy Components Exposed to Fuel Oil

Loss of material due to pitting, crevice, and MIC could occur in stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to fuel oil. HNP manages piping components exposed to fuel oil (except for the Diesel Driven Fire Pump fuel oil supply line discussed below) with the Fuel Oil Chemistry and the One-Time Inspection Programs. The Fuel Oil Chemistry Program maintains fuel oil quality by monitoring and controlling fuel oil contamination in accordance with the plant's Technical Specifications and the guidelines of the American Society for Testing Materials. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

A significant portion of the Diesel Driven Fire Pump fuel oil supply line is made of copper tubing. This material in fuel oil is not susceptible to pitting or crevice corrosion. The NUREG-1801 Fire Protection Program makes special mention of ensuring fuel oil supply to this pump. Therefore, this line is managed with a combination of the Fuel Oil Chemistry Program and the Fire Protection Program.

3.3.2.2.12.2 Stainless Steel Piping Components Exposed to Lubricating Oil

Loss of material due to pitting, crevice, and MIC could occur in stainless steel, piping, piping components, and piping elements exposed to lubricating oil. HNP manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil system contaminants (primarily water and particulates) within acceptable limits; thereby preserving an environment that is not conducive to loss of material, cracking, or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.3.2.2.13 Loss of Material Due to Wear

Loss of material due to wear could occur in elastomer seals and components in an indoor air environment. HNP uses the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program to manage the internal surfaces of the ventilation system components. These internal inspections are performed during the periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

HNP manages the external surfaces of the ventilation system components with the External Surfaces Monitoring Program. The External Surfaces Monitoring Program is based on system inspections and walkdowns. This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual inspection of external surfaces for evidence of material loss.

3.3.2.2.14 Loss of Material Due to Cladding Breach

Loss of material from a cladding breach could occur for PWR charging pump casings with stainless steel cladding exposed to treated borated water. NRC Information Notice 94-63 alerted all holders of operating licenses or construction permits to the potential for significant damage that could result from corrosion of reactor system components caused by cracking of the stainless steel cladding. The description of the circumstances surrounding this information notice is as follows:

> During July and August 1993 the Virginia Electric Power Company discovered severe corrosion damage of the carbon steel casing of a high head safety injection pump at North Anna Unit 1. The damage was caused by cracks through the stainless steel cladding in the pump that allowed corrosive attack by the boric acid coolant. The cracks were discovered when the pump was disassembled for maintenance and rust was observed on the otherwise shiny surface of the cladding in the discharge section of the pump.

The charging pumps at HNP are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Therefore, loss of material due to cladding breach is not applicable for HNP.

3.3.2.2.15 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.3.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Auxiliary Systems components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Cumulative Fatigue Damage (Section 4.3, Metal Fatigue)
2. Crane Cyclic Analyses (Section 4.7, Other TLAAs)

3.3.3 CONCLUSIONS

The Auxiliary Systems components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Auxiliary Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.3.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-01	Steel cranes - structural girders exposed to air – indoor uncontrolled (external)	Cumulative fatigue damage	TLAA to be evaluated for structural girders of cranes. See the Standard Review Plan, Section 4.7 for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue of cranes is addressed as a TLAA. Further Evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-02	Steel and stainless steel piping, piping components, piping elements, and heat exchanger components exposed to air – indoor uncontrolled, treated borated water or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA. Further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-03	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable to PWRs. Further evaluation is documented in Subsection 3.3.2.2.2.
3.3.1-04	BWR Only				
3.3.1-05	Stainless steel and stainless clad steel heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific	This item is not applicable to PWRs. Further evaluation is documented in Subsection 3.3.2.2.3.2.
3.3.1-06	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific	Cracking due to SCC of the stainless steel expansion joint is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.3.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-07	Stainless steel non-regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific	HNP manages cracking of CVCS heat exchanger components with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.4.1.
3.3.1-08	Stainless steel regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMPs that manage the aging effect are the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.4.2.
3.3.1-09	Stainless steel high-pressure pump casing in PWR chemical and volume control system	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMPs that manage the aging effect are the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.4.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-10	High-strength steel closure bolting exposed to air with steam or water leakage.	Cracking due to stress corrosion cracking, cyclic loading	Bolting Integrity The AMP is to be augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	Yes, if the bolts are not replaced during maintenance	This item is not applicable to HNP. Further evaluation is documented in Subsection 3.3.2.2.4.4.
3.3.1-11	Elastomer seals and components exposed to air – indoor uncontrolled (internal/external)	Hardening and loss of strength due to elastomer degradation	Plant specific	Yes, plant specific	The plant-specific AMPs used to manage the aging effects are the External Surfaces Monitoring Program and the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.5.1.
3.3.1-12	Elastomer lining exposed to treated water or treated borated water	Hardening and loss of strength due to elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific	This item is not applicable to HNP. HNP Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Further evaluation is documented in Subsection 3.3.2.2.5.2.
3.3.1-13	Boral, boron steel spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water	Reduction of neutron-absorbing capacity and loss of material due to general corrosion	Plant specific	Yes, plant specific	Reduction of neutron-absorbing capacity does not require aging management. Loss of material is managed by the Water Chemistry Program. Further evaluation is documented in Subsection 3.3.2.2.6.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-14	Steel piping, piping component, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-15	Steel reactor coolant pump oil collection system piping, tubing, and valve bodies exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-16	Steel reactor coolant pump oil collection system tank exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection to evaluate the thickness of the lower portion of the tank	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.7.1.
3.3.1-17	BWR Only				
3.3.1-18	Stainless steel and steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	Plant specific	Yes, plant specific	The plant-specific AMP used to manage the aging effect is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.7.3.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-19	Steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion	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. HNP manages the aging effect with the Buried Piping and Tanks Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.8.
3.3.1-20	Steel piping, piping components, piping elements, and tanks exposed to fuel oil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exception. HNP manages the aging effect with a combination of Fuel Oil Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.9.1. The exception involves differences from the NUREG-1801 recommendations for the Fuel Oil Chemistry Program implementation.
3.3.1-21	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.9.2.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-22	Steel with elastomer lining or stainless steel cladding piping, piping components, and piping elements exposed to treated water and treated borated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. HNP Spent Fuel Pool Cooling and Cleanup components do not have elastomer lining. Further evaluation is documented in Subsection 3.3.2.2.10.1.
3.3.1-23	BWR Only				
3.3.1-24	Stainless steel and aluminum piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable to PWRs as documented in Subsection 3.3.2.2.10.2.
3.3.1-25	Copper alloy HVAC piping, piping components, piping elements exposed to condensation (external)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The HNP AMR methodology does not predict aging effects in the absence of contaminants. Further evaluation is documented in Subsection 3.3.2.2.10.3.
3.3.1-26	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.10.4.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-27	Stainless steel HVAC ducting and aluminum HVAC piping, piping components and piping elements exposed to condensation	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific AMP used to manage the aging effect on Containment Purge System bird screens is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.10.5.
3.3.1-28	Copper alloy fire protection piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The plant-specific program used to manage the aging effect is either the Fire Water System Program or the Selective Leaching of Materials Program. Further evaluation is documented in Subsection 3.3.2.2.10.6.
3.3.1-29	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	This item is not applicable to HNP. Further evaluation is documented in Subsection 3.3.2.2.10.7.
3.3.1-30	BWR Only				
3.3.1-31	BWR Only				

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-32	Stainless steel, aluminum and copper alloy piping, piping components, and piping elements exposed to fuel oil	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Fuel Oil Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exception. HNP manages the aging effect (except for the Diesel Driven Fire Pump fuel oil supply line) with a combination of Fuel Oil Chemistry Program and the One-Time Inspection Program. The exception involves differences from the NUREG-1801 recommendations for the Fuel Oil Chemistry Program implementation. Further evaluation is documented in Subsection 3.3.2.2.12.1.
3.3.1-33	Stainless steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.3.2.2.12.2.
3.3.1-34	Elastomer seals and components exposed to air – indoor uncontrolled (internal or external)	Loss of material due to Wear	Plant specific	Yes, plant specific	The plant-specific AMP used to manage the aging effect on the external surface is the External Surfaces Monitoring Program. The plant-specific AMP used to manage the aging effect on the internal surface is the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Further evaluation is documented in Subsection 3.3.2.2.13.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-35	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material/ cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, "Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify plant-specific program addresses cladding breach	This item is not applicable. The charging pumps at HNP are fabricated from stainless steel and not from carbon steel with stainless steel cladding. Further evaluation is documented in Subsection 3.3.2.2.14.
3.3.1-36	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	Consistent with NUREG-1801. HNP manages the aging effect with the Boraflex Monitoring Program.
3.3.1-37	BWR Only				
3.3.1-38	BWR Only				
3.3.1-39	Stainless steel BWR spent fuel storage racks exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	HNP uses both BWR and PWR spent fuel racks; however, this item is not applicable. Cracking is not identified as an aging effect as these components operate at temperatures less than 140°F.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-40	Steel tanks in diesel fuel oil system exposed to air outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	HNP manages the aging effect for Diesel Driven Fire Pump fuel oil storage tank flame arrestors with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.3.1-41	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable. The Auxiliary Systems at HNP do not contain high-strength steel closure bolting.
3.3.1-42	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See Item Number 3.3.1-43.
3.3.1-43	Steel bolting and closure bolting exposed to air – indoor uncontrolled (external) or air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Bolting Integrity Program. The exception involves differences from the NUREG-1801 recommendations for the Bolting Integrity Program implementation.
3.3.1-44	Steel compressed air system closure bolting exposed to condensation	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	This item is not applicable. See Item Number 3.3.1-43.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-45	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Bolting Integrity Program. The exception involves differences from the NUREG-1801 recommendations for the Bolting Integrity Program implementation.
3.3.1-46	Stainless steel and stainless clad steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.
3.3.1-47	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-48	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The aging effect (for all systems other than the Radioactive Equipment Drains System) is managed by the Closed-Cycle Cooling Water System Program. The Radioactive Equipment Drains System components have been aligned to this item number based on component, material, environment, and aging effect. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.
3.3.1-49	BWR Only				

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-50	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	The aging effect (for all systems other than the Essential Services Chilled Water System (ESCWS) strainers and screens) is managed by the Closed-Cycle Cooling Water System Program. The ESCWS strainer screens/elements have been aligned to this item number based on component, material, environment, and aging effect. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.
3.3.1-51	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.
3.3.1-52	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for the Closed-Cycle Cooling Water System Program implementation.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-53	Steel compressed air system piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general and pitting corrosion	Compressed Air Monitoring	No	This item is not applicable to HNP. HNP has completed steps, in accordance with Generic Letter 88-14, to periodically test air quality, review trend data, and initiate corrective actions, as appropriate, for the Instrument Air System. The internal surfaces of components within the scope of license renewal for the Instrument Air System and the Service Air System are not exposed to condensation.
3.3.1-54	Stainless steel compressed air system piping, piping components, and piping elements exposed to internal condensation	Loss of material due to pitting and crevice corrosion	Compressed Air Monitoring	No	This item is not applicable. See discussion for Item Number 3.3.1-53.
3.3.1-55	Steel ducting closure bolting exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See discussion for Item Number 3.3.1-59.
3.3.1-56	Steel HVAC ducting and components external surfaces exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See discussion for Item Number 3.3.1-59.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-57	Steel piping and components external surfaces exposed to air – indoor uncontrolled (External)	Loss of material due to general corrosion	External Surfaces Monitoring	No	The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See discussion for Item Number 3.3.1-59.
3.3.1-58	Steel external surfaces exposed to air – indoor uncontrolled (external), air outdoor (external), and condensation (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. See discussion for Item Number 3.3.1-59.
3.3.1-59	Steel heat exchanger components exposed to air – indoor uncontrolled (external) or air -outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.3.1-60	Steel piping, piping components, and piping elements exposed to air outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program.
3.3.1-61	Elastomer fire barrier penetration seals exposed to air – outdoor or air - indoor uncontrolled	Increased hardness, shrinkage and loss of strength due to weathering	Fire Protection	No	Consistent with NUREG-1801. The aging effect is managed by the Fire Protection Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-62	Aluminum piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Fire Protection	No	The aging effect is managed by the Fire Water System Program. The Fire Water System Program manages the Diesel Driven Fire Pump right angle and speed reducing gear heat exchanger components by monitoring system performance. The Fire Water System Program manages the aging effect for the automatic sprinkler valves using non-intrusive techniques or visual inspections.
3.3.1-63	Steel fire rated doors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to Wear	Fire Protection	No	The aging effect is managed by the Fire Protection Program and the Structures Monitoring Program.
3.3.1-64	Steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to general, pitting, and crevice corrosion	Fire Protection and Fuel Oil Chemistry	No	Consistent with NUREG-1801 with exceptions. HNP manages the aging effect with a combination of the Fire Protection Program and the Fuel Oil Chemistry Program. The exception involves differences from the NUREG-1801 recommendations for the Fuel Oil Chemistry Program implementation.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-65	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – indoor uncontrolled	Concrete cracking and spalling due to aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	No	HNP manages the aging effect for structures and components outside of containment with a combination of the Fire Protection Program and the Structures Monitoring Program. For the containment cylinder wall, HNP manages the aging effect with a combination of the Fire Protection Program and the ASME Section XI, Subsection IWL Program. HNP uses an alternative Code Edition and Addenda of ASME Section XI, Subsection IWL to that recommended in NUREG-1801.
3.3.1-66	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor	Concrete cracking and spalling due to freeze thaw, aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	No	HNP manages the aging effect for structures and components outside of containment with a combination of the Fire Protection Program and the Structures Monitoring Program. For the containment cylinder wall, HNP manages the aging effect with a combination of the Fire Protection Program and the ASME Section XI, Subsection IWL Program. HNP uses an alternative Code Edition and Addenda of ASME Section XI, Subsection IWL to that recommended in NUREG-1801.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-67	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to corrosion of embedded steel	Fire Protection and Structures Monitoring Program	No	HNP manages the aging effect for structures and components outside of containment with a combination of the Fire Protection Program and the Structures Monitoring Program. For the containment cylinder wall, HNP manages the aging effect with a combination of the Fire Protection Program and the ASME Section XI, Subsection IWL Program. HNP uses an alternative Code Edition and Addenda of ASME Section XI, Subsection IWL to that recommended in NUREG-1801.
3.3.1-68	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	No	The aging effect for the Fire Protection System is managed by the Fire Water System Program. Various drain and waste collection systems have been aligned to this item based on component, material, environment, and aging effect. The aging effect for these systems is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-69	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Fire Water System	No	The aging effect for the Fire Protection System is managed by the Fire Water System Program. Various drain, waste collection, and sampling systems have been aligned to this item based on component, material, environment, and aging effect. The aging effect for these systems is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.3.1-70	Copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	No	The aging effect for the Fire Protection System is managed by the Fire Water System Program. Components in the Oily Drains System have been aligned to this item based on component, material, environment, and aging effect. The aging effect for this system is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-71	Steel piping, piping components, and piping elements exposed to moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	The aging effect (for the Component Cooling Water, ESCWS, Fire Protection, Emergency Diesel Generator, Emergency Diesel Generator support, and Security Power Systems) is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The components in the Diesel Generator Fuel Oil Storage and Transfer, Security Power, and Fire Protection Systems with air spaces above fuel oil (e.g., Fuel Oil Day Tank vents and appurtenances) use a combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program.
3.3.1-72	Steel HVAC ducting and components internal surfaces exposed to condensation (Internal)	Loss of material due to general, pitting, crevice, and (for drip pans and drain lines) microbiological-ly influenced corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	The aging effect (for HNP HVAC Systems) is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. The air space above fuel oil for the Diesel Fuel Oil Storage Tank Building Tank Liner and the Fuel Oil Day Tanks uses a combination of the Fuel Oil Chemistry Program and the One-Time Inspection Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-73	Steel crane structural girders in load handling system exposed to air- indoor uncontrolled (external)	Loss of material due to general corrosion	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Overhead Heavy Load and Light Load Handling Systems Program.
3.3.1-74	Steel cranes - rails exposed to air – indoor uncontrolled (external)	Loss of material due to Wear	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Overhead Heavy Load and Light Load Handling Systems Program.
3.3.1-75	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Open-Cycle Cooling Water System	No	This item is not applicable. HNP does not have elastomer seals and components exposed to raw water within the scope of license renewal.
3.3.1-76	Steel piping, piping components, and piping elements (without lining/coating or with degraded lining/coating) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiological-ly influenced corrosion, fouling, and lining/coating degradation	Open-Cycle Cooling Water System	No	The aging effect for the NSW System, ESW System, ESCWS, and Emergency Screen Wash System is managed by the Open-Cycle Cooling Water System Program. Other systems have been aligned to this item number and manage the aging effect with the One-Time Inspection Program, External Surfaces Monitoring Program or the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-77	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	The aging effect for the ESW System, ESCWS, and the Diesel Generator Cooling Water System is managed by the Open-Cycle Cooling Water System Program. Piping components in the Boron Thermal Regeneration System have been aligned to this item number based on component, material, environment, and aging effect. The aging effect is managed by the One-Time Inspection Program.
3.3.1-78	Stainless steel, nickel alloy, and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Open-Cycle Cooling Water System	No	This item is not applicable. See Item Numbers 3.3.1-79 through 3.3.1-83.
3.3.1-79	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Open-Cycle Cooling Water System	No	The aging effect for the CVCS, NSW System, ESCWS, and Emergency Screen Wash System is managed by the Open-Cycle Cooling Water System Program. Components in the Screen Wash System, NSW System, and the Upflow Filter System have been aligned to this item number and manage the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-80	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion	Open-Cycle Cooling Water System	No	The aging effect for the CVCS, NSW System, ESW System, ESCWS, and Emergency Screen Wash System is managed by the Open-Cycle Cooling Water System Program. Components in the Circulating Water System, Screen Wash System, NSW System, Upflow Filter System, and the Reactor Auxiliary Building Ventilation System have been aligned to this item number and manage the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.3.1-81	Copper alloy piping, piping components, and piping elements, exposed to raw water	Loss of material due to pitting, crevice, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	The aging effect for the Emergency Screen Wash System is managed by the Open-Cycle Cooling Water System Program. Components in the Screen Wash System, Waste Processing Building (WPB) Cooling Water System, and the Upflow Filter System have been aligned to this item number and manage the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-82	Copper alloy heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, galvanic, and microbiological-ly influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	The aging effect for the CVCS, Component Cooling Water System, ESCWS, Diesel Generator Cooling Water System, and Containment Cooling System is managed by the Open-Cycle Cooling Water System Program. Components in the WPB Cooling Water System have been aligned to this item number and manage the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.3.1-83	Stainless steel and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801. The aging effect is managed by the Open-Cycle Cooling Water System Program.
3.3.1-84	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to raw water, treated water, or closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801 with exceptions. The aging effect is managed for susceptible components using the Selective Leaching of Materials Program. The exception involves differences from the NUREG-1801 recommendations for Selective Leaching of Materials Program implementation.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-85	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801 with exceptions. The aging effect is managed for susceptible components using the Selective Leaching of Materials Program. The exception involves differences from the NUREG-1801 recommendations for Selective Leaching of Materials Program implementation.
3.3.1-86	Structural steel (new fuel storage rack assembly) exposed to air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Structures Monitoring Program	No	Loss of material due to general, pitting, and crevice corrosion is not applicable because the new fuel storage racks are manufactured from stainless steel, which has no aging effects in an Air-Indoor environment. Refer to NUREG-1801, Volume 2, Item III.B5-5.
3.3.1-87	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated borated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the Boraflex Monitoring Program.
3.3.1-88	Aluminum and copper alloy >15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-89	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.3.1-90	Stainless steel and steel with stainless steel cladding piping, piping components, piping elements, tanks, and fuel storage racks exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	The aging effect is managed by the Water Chemistry Program. Spent Resin Storage and Transfer System components have been aligned to this item, and the aging effect is managed with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program. Components wetted by spent fuel pool water are not normally exposed to temperatures above 140°F. Therefore, this aging effect is not applicable for the Spent Fuel Pool Cooling System, Spent Fuel Pool Cleanup System, Spent Fuel Cask Decontamination and Spray System, and Spent Fuel Storage Racks.
3.3.1-91	Stainless steel and steel with stainless steel cladding piping, piping components, and piping elements exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	The aging effect is managed by the Water Chemistry Program. Components in the Radioactive Equipment Drains System and Spent Resin Storage and Transfer System have been aligned to this item number and manage the aging effect with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-92	Galvanized steel piping, piping components, and piping elements exposed to air – indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-93	Glass piping elements exposed to air, air – indoor uncontrolled (external), fuel oil, lubricating oil, raw water, treated water, and treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-94	Stainless steel and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-95	Steel and aluminum piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-96	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-97	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.3.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VII OF NUREG-1801 FOR AUXILIARY SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1-98	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-99	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.3.2-1 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Backflushable Filters	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A, 346
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A, 346
Boric Acid Transfer Pumps	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging and Safety Injection Pump Gear Lube Oil Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)		H
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
Charging Pump Mini-Flow Orifices	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging Pump Mini-Flow Orifices (continued)	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	V.D1-14 (E-24)	3.2.1-12	E
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A, 334
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 334
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B, 334

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F, 334
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC		VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Charging and Safety Injection Pump Lube Oil Pumps	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging and Safety Injection Pump Lube Oil Pumps (continued)	M-1	Gray Cast Iron	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-14 (AP-31)		G
Charging and Safety Injection Pumps	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-7 (A-76)	3.3.1-09	E, 369
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Charging and Safety Injection Pumps Gear Oil Cooler Components	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging and Safety Injection Pumps Gear Oil Cooler Components (continued)	M-1	Copper Alloy <15% Zn	Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-12 (AP-47)	3.3.1-26	C
		Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)	3.3.1-33	C
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)		H
			Raw Water (Inside)	Flow Blockage due to Fouling	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging and Safety Injection Pumps Gear Oil Cooler Tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	V.D1-8 (EP-47)	3.2.1-09	C, 369
Charging and Safety Injection Pumps Oil Cooler Components	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-12 (AP-47)	3.3.1-26	C

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Charging and Safety Injection Pumps Oil Cooler Components (continued)	M-1	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)	3.3.1-33	C
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)		H
			Raw Water (Inside)	Flow Blockage due to Fouling	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Charging and Safety Injection Pumps Oil Cooler Tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	V.D1-8 (EP-47)	3.2.1-09	C, 369

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CSIP Lube Oil Piping Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)		H
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-13 (AP-43)		G
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-12 (AP-47)	3.3.1-26	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CSIP Lube Oil Piping Components (continued)	M-1	Glass	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Gray Cast Iron	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-14 (AP-31)		G
		Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)	3.3.1-33	A
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.E1-15 (AP-59)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Excess Letdown Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Excess Letdown Heat Exchanger Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-4 (A-100)	3.3.1-02	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-5 (A-84)	3.3.1-08	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-3	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Letdown Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Letdown Heat Exchanger Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-4 (A-100)	3.3.1-02	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-9 (A-69)	3.3.1-07	E, 333
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.C-5 (S-15)	3.4.1-29	C, 367
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	D, 368
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-25 (S-10)	3.4.1-04	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		G, 367

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A, 370
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A, 370
		Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	A
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Regenerative Heat Exchanger Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-4 (A-100)	3.3.1-02	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-5 (A-84)	3.3.1-08	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seal Water Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-4 (A-100)	3.3.1-02	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-9 (A-69)	3.3.1-07	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A, 347
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A, 347
Tank Diaphragm	M-4	Elastomers	Treated Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-1 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CHEMICAL AND VOLUME CONTROL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tanks	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Volume Control Tank	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-2 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
BTRS Chiller Lube Oil Cooler	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	C
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Letdown Chiller Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Letdown Reheat Heat Exchanger Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-4 (A-100)	3.3.1-02	C
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VII.E1-5 (A-84)	3.3.1-08	E
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Moderating Heat Exchanger Components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)	3.3.1-14	A
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-19 (AP-30)		H

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection	VII.C1-5 (A-64)	3.3.1-77	E, 376, 369
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	D, 372
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-13 (AP-43)		G
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.E1-12 (AP-47)	3.3.1-26	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-15 (SP-61)	3.4.1-15	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-11 (AP-12)	3.3.1-51	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-13 (AP-43)	3.3.1-84	B
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Glass	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-2 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON THERMAL REGENERATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Tanks	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	D, 372
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A

TABLE 3.3.2-3 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY MAKEUP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		G
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F

TABLE 3.3.2-3 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MAN AGEMENT EVALUATION – PRIMARY MAKEUP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, and piping elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)		G

TABLE 3.3.2-3 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MAN AGEMENT EVALUATION – PRIMARY MAKEUP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Makeup Water Storage Tank	M-1	Stainless Steel	Air - Outdoor (Inside)	None	None	VII.J-15 (AP-17)		G, 732
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)		G, 732
Tank Diaphragm	M-4	Elastomers	Treated Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Air - Outdoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)		G

TABLE 3.3.2-4 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	C, 378
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 704

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	C, 378
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Primary Sampling Condenser Components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A, 385
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D, 386

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Sampling Condenser Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 386
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A, 385
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A, 385
Primary Sampling Condenser Tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C, 385

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Sampling Condenser Tubes (continued)	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-19 (AP-22)	3.3.1-97	C, 385
Primary Sampling Cooler Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry			J
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Sampling Cooler Components (continued)	M-1	Stainless Steel	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D
Primary Sampling Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry			J
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D
Primary Sampling Evaporator Components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A, 385
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D, 386

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Sampling Evaporator Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 386
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-6 (AP-43)	3.3.1-84	D
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A, 385
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-19 (AP-22)	3.3.1-97	A, 385

TABLE 3.3.2-4 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Sampling Evaporator Tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C, 385
		Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D, 386
			Air/Gas (Dry) (Outside)	None	None	VII.J-19 (AP-22)	3.3.1-97	C, 385

TABLE 3.3.2-5 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST-ACCIDENT SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 704
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J

TABLE 3.3.2-5 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST ACCIDENT SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 704
			Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	C, 378
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-6 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B

TABLE 3.3.2-6 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309
		Elastomers	Raw Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 734

TABLE 3.3.2-6 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Elastomers	Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 734
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-7 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Fiber Glass or Fiber Reinforced Plastic	Raw Water (Inside)	None	None			J
			Soil (Outside)	None	None			J
Closure bolting	M-1	Carbon or Low Alloy Steel	Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosionb Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 322
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	C
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E 329
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.C1-19 (A-38)	3.3.1-76	E 329
		PVC or Thermo-plastics	Raw Water (Inside)	None	None			J
			Raw Water (Outside)	None	None			J

TABLE 3.3.2-7 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spray Nozzles	M-8	PVC or Thermo-plastics	Raw Water (Inside)	None	None			J
			Raw Water (Outside)	None	None			J

TABLE 3.3.2-8 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER MAKE-UP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion ne	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B

TABLE 3.3.2-8 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER MAKE-UP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion ne	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309

TABLE 3.3.2-9 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 322

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Service Screen Wash Pumps	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
				Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)		H, 724
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Service Screen Wash Pumps	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E, 329
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E, 329

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
				Flow Blockage due to General Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)		H, 712
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-9 (A-44)	3.3.1-81	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 328
		Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
System strainer screens/elements	M-2	Copper Alloy >15% Zn	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-9 (A-44)	3.3.1-81	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	D
		Stainless Steel	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E

TABLE 3.3.2-9 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-10 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 327
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 322, 327

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Normal Service Water Pumps	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
				Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)		H, 724
			Air -Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Normal Service Water Pumps (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E, 329
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-11 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E, 329

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Normal Service Water Seal & Bearing Water Booster Pump	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
				Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)		H, 724
			Air -Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	None	None			J, 303
System strainer screens/elements	M-2	Stainless Steel	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E

TABLE 3.3.2-10 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – NORMAL SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309
		Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E
			Air - Outdoor (Outside)	None	None			J, 303

TABLE 3.3.2-11 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Carbon or Low Alloy Steel	Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 322
		Stainless Steel	Air - Outdoor (Outside)	None	None			J, 303
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 327, 322

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Emergency Service Water Pumps	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Loss of Material due to Erosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)		H, 724
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 323

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 326

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Flow Blockage due to General Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)		H, 318
				Loss of Material due to Galvanic Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C, 331
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C, 309
			Air/Gas (Dry) (Outside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 328, 324
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Elastomers	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)		F
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 325
				None	None			J, 325

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	None	None			J, 303
System strainer screens/elements	M-2	Stainless Steel	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C

TABLE 3.3.2-11 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT – EMERGENCY SERVICE WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-12 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Component Cooling Water Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Component Cooling Water Heat Exchanger Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy <15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C
			Treated Water (Outside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D
Component Cooling Water Heat Exchanger Tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Component Cooling Water Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Component Cooling Water Surge Tank	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C, 709
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	None	None			J, 708

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 319
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C, 302
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	None	None	VII.J-20 (AP-2)	3.3.1-95	A, 708
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-12 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – COMPONENT COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Glass	Air - Indoor (Inside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
			Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-13 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D, 707
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-13 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-9 (A-44)	3.3.1-81	E, 707
				Loss of Material due to Galvanic Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-3 (A-65)	3.3.1-82	E, 707
			Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	B, 707

TABLE 3.3.2-14 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Essential Chilled Water Chiller Condensers Components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	C
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Essential Chilled Water Chiller Condensers Components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy <15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C
Essential Chilled Water Chiller Condensers Tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C, 316

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Essential Chilled Water Compressors Oil Coolers Components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.F1-19 (AP-30)	3.3.1-14	C
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.F1-19 (AP-30)		H, 317
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Essential Chilled Water Compressors Oil Coolers Components (continued)	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.F1-19 (AP-30)	3.3.1-14	C
				Loss of Material due to Galvanic Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.F1-19 (AP-30)		H, 317
		Copper Alloy <15% Zn	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	C
Essential Chilled Water Compressors Oil Coolers Tubes	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
Essential Chilled Water System Chiller Cooler Components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-23 (AP-6)	3.3.1-97	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Essential Chilled Water System Chiller Cooler Components (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
		Copper Alloy <15% Zn	Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	A
		Glass	Air/Gas (Dry) (Inside)	None	None			J, 320
			Air - Indoor (Outside)	None	None	VII.J-7 (AP-48)	3.3.1-93	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Essential Chilled Water System Chiller Coolers Tubes	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Air/Gas (Dry) (Outside)	None	None	VII.J-4 (AP-9)	3.3.1-97	C, 316
Essential Chilled Water System Condenser Service Water Recirculation Pump (P7)	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	C
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Essential Chilled Water System Water Pumps (P4)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Raw Water (Inside)	Flow Blockage due to General Corrosion	Open-Cycle Cooling Water System			J, 725, 318
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	C, 725
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air/Gas (Dry) (Outside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)		H, 314
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)		H, 314
Piping, piping components, piping elements, and tanks	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.A3-4 (AP-1)	3.3.1-88	C

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-13 (AP-30)	3.3.1-14	A
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	C
				Flow Blockage due to General Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)		H, 318

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)		H
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-5 (AP-47)	3.3.1-26	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C2-5 (AP-47)		H, 315
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None			J, 321
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.C2-12 (AP-59)	3.3.1-33	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	C
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)		H
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
				None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-2	Stainless Steel	Treated Water (Outside)	Flow Blockage due to Fouling	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 726
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.C2-10 (A-52)	3.3.1-50	E
System strainers	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	C
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)		H, 314
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)		H, 314
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-14 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tanks (continued)	M-1	Glass	Treated Water (Inside)	None	None	VII.J-13 (AP-51)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A

TABLE 3.3.2-15 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NON-ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.A3-4 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-14 (A-25)	3.3.1-47	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)		J, 311

TABLE 3.3.2-15 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – NON-ESSENTIAL SERVICES CHILLED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Closed-Cycle Cooling Water System	VII.H2-18 (AP-55)		J, 311
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-16 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 322

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 327
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity			J, 327, 322
Emergency Service Water Screen Wash Pumps	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 326
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)	3.3.1-76	A
				Flow Blockage due to General Corrosion	Open-Cycle Cooling Water System	VII.C1-19 (A-38)		H, 318
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.C1-18 (A-01)	3.3.1-19	A

TABLE 3.3.2-16 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SCREEN WASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-15 (A-54)	3.3.1-79	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Open-Cycle Cooling Water System	VII.H2-18 (AP-55)	3.3.1-80	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-8	Copper Alloy >15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-9 (A-44)	3.3.1-81	A, 330
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	B, 330
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 328

TABLE 3.3.2-17 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Diesel combustion air intake filter housings and silencers	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel combustion air intake piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		J, 396
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)		J, 396
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel engine exhaust; Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		J, 396
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Diesel Exhaust (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)		J, 396
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-1 (AP-33)	3.3.1-06	E
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel engine governor oil cooler components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-5 (AP-39)	3.3.1-21	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	A
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-8 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel engine governor oil cooler components (continued)	M-1	Copper Alloy >15% Zn	Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	C
Diesel engine governor oil cooler tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
Diesel engine turbocharger intercooler components	M-1	Aluminum or Aluminum Alloys	Air/Gas (Wetted) (Outside)	None	None	V.F-2 (EP-3)	3.2.1-50	C
		Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel engine turbocharger intercooler components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	A
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-8 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D
			Air/Gas (Wet-ted) (Outside)	None	None	VII.J-3 (AP-8)		G, 393
Diesel engine turbocharger intercooler tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D

TABLE 3.3.2-17 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY DIESEL GENERATOR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Exhaust Silencers	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-18 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.H1-9 (A-01)	3.3.1-19	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Fuel Oil Storage Tank Building Tank Liners	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fuel Oil Chemistry and One-Time Inspection	VII.F4-2 (A-08)	3.3.1-72	E, 723
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-21 (A-23)	3.3.1-71	E, 723
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	D
Flow restricting elements	M-1	Stainless Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-6 (AP-54)	3.3.1-32	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-3	Stainless Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-6 (AP-54)	3.3.1-32	B
Fuel oil day tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fuel Oil Chemistry and One-Time Inspection	VII.F4-2 (A-08)	3.3.1-72	E, 723
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-21 (A-23)	3.3.1-71	E, 723
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel oil day tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 398, 309
Fuel Oil System Transfer Pumps	M-1	Stainless Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-6 (AP-54)	3.3.1-32	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Fuel oil tank flame arrester elements	M-5	Stainless Steel	Air/Gas (Wetted) (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 399

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel oil tank flame arresters	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)		G

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-6 (AP-54)	3.3.1-32	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-18 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-2	Stainless Steel	Fuel Oil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-16 (AP-54)	3.3.1-32	B
System strainers	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-19 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Diesel Engine Lube Oil Sumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)		H, 397
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)		H, 397
Lube Oil Auxiliary Pumps (Motor Driven)	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Cooler components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-5 (AP-39)	3.3.1-21	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	A
		Copper Alloy <15% Zn	Treated Water (Inside)	None	None	VII.J-5 (AP-11)		G
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	C

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Cooler tubes	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
Lube Oil Keep Warm Pumps	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	None	None			J, 729
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Glass	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)		H, 397
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-19 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR LUBRICATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-2	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	A
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)		H, 397
System strainers	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-20 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Diesel Jacket Water Keep Warm Pumps	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F4-14 (AP-31)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Jacket Water Standpipes, Vents & Heaters	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
Jacket Water Cooler components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-5 (A-64)	3.3.1-77	C

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Jacket Water Cooler components (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	A
		Copper Alloy <15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	C
			Treated Water (Outside)	None	None	VII.J-5 (AP-11)		G

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Jacket Water Cooler tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	B
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-20 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR COOLING WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-16 (AP-31)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	B
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	B
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-21 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - DIESEL GENERATOR AIR STARTING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Diesel Starting Air Tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR AIR STARTING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
		Copper Alloy <15% Zn	Air/Gas (Wetted) (Inside)	None	None	VII.J-5 (AP-11)		G
			Air - Indoor (Outside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR AIR STARTING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-13 (A-47)		G
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Glass	Air/Gas (Dry) (Inside)	None	None	VII.J-7 (AP-48)	3.3.1-93	A, 736
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A, 736
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 397
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-21 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR AIR STARTING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-2	Stainless Steel	Air/Gas (Wetted) (Outside)	Cracking due to SCC Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 397
System strainers	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-22 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-21 (A-23)	3.3.1-71	E, 728
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B, 728
		Fiber Glass or Fiber Rein-forced Plastic	Soil (Outside)	None	None			J, 728

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-1 (AP-28)		H, 364

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel combustion air intake piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
			Air/Gas (Wetted) (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
		Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel engine exhaust; Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		J, 720
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Fuel Oil (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
			Lubricating Oil or Hydraulic Fluid (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	C, 703
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 703, 309

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil System Transfer Pumps	M-1	Copper Alloy >15% Zn	Fuel Oil (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H1-4 (AP-43)		G, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-3 (AP-44)	3.3.1-32	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
Fuel oil tank flame arrester elements	M-5	Aluminum or Aluminum Alloys	Air/Gas (Wetted) (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
		Stainless Steel	Air/Gas (Wetted) (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 399
Fuel oil tank flame arresters	M-1	Aluminum or Aluminum Alloys	Air/Gas (Wetted) (Inside)	None	None	VII.J-1 (AP-36)		G
			Air - Outdoor (Outside)	None	None	VII.J-1 (AP-36)		G

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel oil tank flame arresters (continued)	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	A
Lube Oil Cooler components	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-5 (AP-39)	3.3.1-21	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-11 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Cooler components (continued)	M-1	Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-9 (AP-65)	3.3.1-84	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-11 (AP-47)	3.3.1-26	C
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VIII.G-2 (S-25)	3.4.1-25	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VIII.G-28 (SP-54)	3.4.1-23	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	C
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)		H, 397

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lube Oil Cooler tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
		Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VIII.G-11 (SP-41)	3.4.1-27	D
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-12 (SP-62)	3.4.1-10	C
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-24 (A-30)	3.3.1-20	D

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
			Concrete (Outside)	None	None	VII.J-21 (AP-3)	3.3.1-96	A
		Copper Alloy >15% Zn	Fuel Oil (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H1-4 (AP-43)		G, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-9 (AP-44)	3.3.1-32	D

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-10 (AP-47)	3.3.1-26	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-8 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
		Elastomers	Fuel Oil (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
				None	None	VII.J-9 (AP-49)		F, 702
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.I-8 (A-77)		F, 353
			Air/Gas (Wet-ted) (Outside)	None	None	VII.J-8 (AP-14)		F, 702

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials			J, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-20 (AP-30)	3.3.1-14	C
			Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-16 (AP-31)	3.3.1-85	D
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	D
		PVC or Ther-moplastics	Fuel Oil (Inside)	None	None	VII.J-9 (AP-49)		F
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)		F

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-17 (AP-59)	3.3.1-33	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VIII.G-27 (SP-39)	3.4.1-25	D
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Radiator Components	M-1	Aluminum or Aluminum Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System			J
			Air - Indoor (Outside)	None	None	VII.J-1 (AP-36)	3.3.1-95	C
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.F1-8 (AP-34)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.F1-9 (AP-65)	3.3.1-84	D
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C

TABLE 3.3.2-22 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY POWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Radiator tubes	M-5	Copper Alloy >15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	D
Tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H2-21 (A-23)	3.3.1-71	E, 723
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-23 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self- loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-23 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – INSTRUMENT AIR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-24 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SERVICE AIR SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-25 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BULK NITROGEN STORAGE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self- loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-26 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – HYDROGEN GAS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 337
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-27 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Buried piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A, 329
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-15 (A-02)	3.3.1-85	B

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
			Air - Outdoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting (continued)	M-1	Carbon or Low Alloy Steel	Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	C
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B, 730
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
		Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System	VII.G-19 (A-55)		H, 350
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Fire Pump	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
		Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Fire Pump (continued)	M-1	Gray Cast Iron	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 351
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329
Diesel Driven Fire Pump Fuel Oil Storage Tank	M-1	Carbon or Low Alloy Steel	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.H1-10 (A-30)	3.3.1-20	B

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Driven Fire Pump Fuel Oil Storage Tank (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 306
Diesel engine exhaust; Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		J, 720
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Diesel Exhaust Silencers	M-1	Carbon or Low Alloy Steel	Diesel Exhaust (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-2 (A-27)	3.3.1-18	E
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
Filters	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 713

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filters (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	C
Fuel oil tank flame arrester elements	M-5	Stainless Steel	Air/Gas (Wetted) (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 399
Fuel oil tank flame arresters	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H1-11 (A-95)	3.3.1-40	E
		Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heat Exchanger Components	M-1	Aluminum or Aluminum Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-8 (AP-83)	3.3.1-62	E, 359
				Loss of Material due to Galvanic Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System	VII.G-8 (AP-83)		J, 359, 350
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System			J
			Air - Outdoor (Outside)	None	None	VII.J-1 (AP-36)		G, 354
		Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.H2-5 (AP-39)	3.3.1-21	C
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-6 (AP-40)	3.3.1-59	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heat Exchanger Components (continued)	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	C
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-11 (AP-47)	3.3.1-26	C
		Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	C
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	D
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-2 (AP-34)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heat Exchanger Components (continued)	M-1	Glass	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VII.J-10 (AP-15)	3.3.1-93	A, 355
			Air - Outdoor (Outside)	None	None	VII.J-7 (AP-48)	3.3.1-93	A, 355
Heat exchanger tubes	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Fire Water System			J, 359
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-8 (SP-53)	3.4.1-10	C
		Copper Alloy >15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Fire Water System			J, 359
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-2 (AP-80)	3.3.1-52	D

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Jockey Fire Pump	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
		Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Jockey Fire Pump (continued)	M-1	Gray Cast Iron	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 351
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329
Motor Driven Fire Pump	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Fire Pump (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
		Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 351

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Motor Driven Fire Pump (continued)	M-1	Gray Cast Iron	Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-8 (AP-83)	3.3.1-62	E, 360
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System	VII.G-8 (AP-83)		H, 350
			Air - Indoor (Outside)	None	None	VII.J-1 (AP-36)	3.3.1-95	A, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.G-23 (A-23)	3.3.1-71	E, 356
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)	3.3.1-71	A, 357
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-23 (A-23)		H, 357
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Fire Protection and Fuel Oil Chemistry	VII.G-21 (A-28)	3.3.1-64	B
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Protection and Fuel Oil Chemistry	VII.G-21 (A-28)		H, 365

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-18 (A-34)		J, 731
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-22 (AP-30)	3.3.1-14	A
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-23 (A-25)	3.3.1-47	D

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-4 (AP-40)	3.3.1-59	C
		Copper Alloy <15% Zn	Fuel Oil (Inside)	Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Protection and Fuel Oil Chemistry	VII.G-10 (AP-44)	3.3.1-32	E, 352
			Air - Outdoor (Outside)	None	None	VII.J-5 (AP-11)	3.3.1-99	A, 362
		Copper Alloy >15% Zn	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)		G, 357
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)		G, 358, 357

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.G-10 (AP-44)	3.3.1-32	B
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-10 (AP-44)		H, 361
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)		G, 361
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-11 (AP-47)	3.3.1-26	A
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.H2-8 (AP-12)	3.3.1-51	D
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.H2-12 (AP-43)	3.3.1-84	D
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
			Air - Outdoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 395
		Elastomers	Fuel Oil (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
			Lubricating Oil or Hydraulic Fluid (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
			Treated Water (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Elastomers	Air - Outdoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring			J, 353
		Galvanized Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Air/Gas (Wet-ted) (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)		G, 358, 357
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)		G, 357
			Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A, 329

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 351
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	A, 351
		PVC or Thermo-plastics	Lubricating Oil or Hydraulic Fluid (Inside)	None	None			J, 717
		Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J
			Fuel Oil (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fuel Oil Chemistry and One-Time Inspection	VII.G-17 (AP-54)	3.3.1-32	B

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-18 (AP-59)	3.3.1-33	A
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System	VII.G-19 (A-55)		H, 350
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 395

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spray Nozzles	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None			J
			Air - Outdoor (Outside)	None	None			J
	M-8	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None			J
			Air - Outdoor (Outside)	None	None			J

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sprinkler Heads	M-1	Copper Alloy >15% Zn	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)		G, 357
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)		G, 358, 357
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sprinkler Heads (continued)	M-8	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
System strainer screens/elements	M-2	Copper Alloy >15% Zn	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A, 718
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B, 718

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainer screens/elements	M-2	Stainless Steel	Raw Water (Outside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-19 (A-55)	3.3.1-69	A
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Fire Water System	VII.G-19 (A-55)		H, 350
System strainers	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-24 (A-33)	3.3.1-68	A
			Air - Indoor (Outside)	Loss of Material due to General Corrosion Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-27 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FIRE PROTECTION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Fire Water System	VII.G-12 (A-45)	3.3.1-70	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 719
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-28 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STORM DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E

TABLE 3.3.2-28 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STORM DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-29 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-1 (AP-28)	3.3.1-43	B
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-1 (AP-28)		H
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
		Copper Alloy >15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E, 373
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E
			Concrete (Outside)	None	None	VII.J-21 (AP-3)	3.3.1-96	A
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E, 373

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-15 (A-02)	3.3.1-85	B
System strainers	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B

TABLE 3.3.2-29 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-1	Copper Alloy >15% Zn	Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E, 373
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
	M-2	Copper Alloy >15% Zn	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	B
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-12 (A-45)	3.3.1-70	E

TABLE 3.3.2-30 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E, 373
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Raw Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E
			Raw Water (Outside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-14 (A-51)	3.3.1-85	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E, 373

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Concrete (Outside)	None	None	VII.J-17 (AP-19)	3.3.1-96	A
System strainers	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-1	Stainless Steel	Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 373
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)		H, 373
	M-2	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)		H
Tanks	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E

TABLE 3.3.2-30 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE FLOOR DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-31 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-6 (A-63)	3.3.1-48	E, 375

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-6 (A-63)	3.3.1-48	E, 375, 373
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-6 (A-63)	3.3.1-48	E, 375
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-14 (AP-31)	3.3.1-85	B

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Gray Cast Iron	Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-6 (A-63)	3.3.1-48	E, 375, 373
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.E1-14 (AP-31)	3.3.1-85	B
		Stainless Steel	Silicone Fluid (Inside)	None	None	VII.J-19 (AP-22)		J, 301
			Treated Water (Inside)	Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 375
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Concrete (Outside)	None	None	VII.J-17 (AP-19)	3.3.1-96	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375, 373

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Drain Tank Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 375
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D

TABLE 3.3.2-31 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIOACTIVE EQUIPMENT DRAINS SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Reactor Coolant Drain Tank Heat Exchanger Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 375
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D
System strainers	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375, 373
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375, 373
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E, 375, 373

TABLE 3.3.2-32 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY WASTE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-22 (AP-30)	3.3.1-14	A, 374
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E, 733

TABLE 3.3.2-32 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY WASTE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
			Concrete (Outside)	None	None	VII.J-21 (AP-3)	3.3.1-96	A
			Soil (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Buried Piping and Tanks Inspection	VII.G-25 (A-01)	3.3.1-19	A

TABLE 3.3.2-32 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY WASTE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Ceramic	Raw Water (Inside)	None	None	VII.G-19 (A-55)		F
			Air - Indoor (Outside)	None	None	VII.J-7 (AP-48)		F
		Glass	Raw Water (Inside)	None	None	VII.J-11 (AP-50)	3.3.1-93	A
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
		PVC or Thermo-plastics	Raw Water (Inside)	None	None	VII.J-11 (AP-50)		F
			Air - Indoor (Outside)	None	None	VII.J-8 (AP-14)		F
		Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VII.G-18 (AP-59)	3.3.1-33	A, 374
			Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 733
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-33 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
FHB Decontamination Receiving and Transfer Tank	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
FHB Decontamination Transfer Pumps	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
FHB Decontamination Transfer Pumps (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
FHB Detergent Drain Sump Pumps	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 373
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H, 373

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
RAB Detergent Drain Sump Pumps	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RAB Detergent Drain Sump Pumps (continued)	M-1	Stainless Steel	Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 373
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H, 373
System strainers	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Raw Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 373
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H, 373

TABLE 3.3.2-33 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LAUNDRY AND HOT SHOWER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
System strainers (continued)	M-2	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
WPB Laundry and Hot Shower Tanks	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C

TABLE 3.3.2-34 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – UPFLOW FILTER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)	3.3.1-76	E
				Loss of Material due to Erosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.C1-19 (A-38)		H, 724
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.G-5 (AP-41)	3.3.1-59	C

TABLE 3.3.2-34 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – UPFLOW FILTER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.C1-9 (A-44)	3.3.1-81	E
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.C1-10 (A-47)	3.3.1-84	B
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 328
		Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.C1-15 (A-54)	3.3.1-79	E
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-35 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POTABLE AND SANITARY WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 735
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 348

TABLE 3.3.2-35 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POTABLE AND SANITARY WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 735
		Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.F-18 (SP-55)	3.4.1-35	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 348
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 344
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-35 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POTABLE AND SANITARY WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 348
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.E-23 (SP-27)	3.4.1-36	D
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 348
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-36 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DEMINERALIZED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	C
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-36 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DEMINERALIZED WATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.F-18 (SP-55)	3.4.1-35	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-15 (SP-61)	3.4.1-15	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Concrete (Outside)	None	None	VII.J-17 (AP-19)	3.3.1-96	A

TABLE 3.3.2-37 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FILTER BACKWASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	C

TABLE 3.3.2-37 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FILTER BACKWASH SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-38 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIATION MONITORING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flow Straighteners	M-1	Stainless Steel	Air - Indoor (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)		H, 701
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 387
Piping, piping components, and piping elements	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 390

TABLE 3.3.2-38 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADIATION MONITORING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	C, 388
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	C, 388
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 391
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C, 388
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C, 389
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C, 389
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-39 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY WASTE COLLECTION AND SEPARATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E, 733

TABLE 3.3.2-39 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – OILY WASTE COLLECTION AND SEPARATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C

TABLE 3.3.2-40 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID WASTE PROCESSING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Liquid Waste Holdup Tank	M-1	Stainless Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-24 (A-33)	3.3.1-68	E

TABLE 3.3.2-40 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – LIQUID WASTE PROCESSING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-41 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY WASTE TREATMENT SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, piping elements, and tanks	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A

TABLE 3.3.2-41 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY WASTE TREATMENT SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks (continued)	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 733
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.G-19 (A-55)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON RECYCLE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Heat Exchanger Components	M-1	Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D, 335
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-4 (E-19)	3.2.1-28	D, 335
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C, 335
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C, 335

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON RECYCLE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heat Exchanger Components (continued)	M-1	Stainless Steel	Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Treated Water (Outside)	Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D, 335
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	V.D1-4 (E-19)	3.2.1-28	D, 335
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C, 335
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	C, 335
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.E1-6 (A-63)	3.3.1-48	D

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON RECYCLE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-1 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D, 345
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D, 345
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A, 345
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A, 345
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-42 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – BORON RECYCLE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tanks	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	A
				Cracking due to SCC	Water Chemistry	VII.E1-20 (AP-82)	3.3.1-90	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-43 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GASEOUS WASTE PROCESSING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 379
				Loss of Material due to Crevice Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.D-2 (A-26)		H, 379

TABLE 3.3.2-43 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GASEOUS WASTE PROCESSING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J
Piping, piping components, piping elements, and tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 379
				Loss of Material due to Crevice Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.D-2 (A-26)		H, 379
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-43 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – GASEOUS WASTE PROCESSING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, piping elements, and tanks	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 379
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.D-4 (AP-81)		H, 379
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-44 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – RADWASTE SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Raw Water (Inside)	Flow Blockage due to Fouling Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)	3.3.1-69	E, 392
				Cracking due to SCC Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.G-19 (A-55)		H, 392
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C, 380
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-45 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REFUELING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Nickel Base Alloys	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F, 312
			Treated Water (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		G, 312
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)		G, 312
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A2-1 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A2-1 (AP-79)	3.3.1-91	A
Piping, piping components, and piping elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	C, 336
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-46 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL POOL COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A

TABLE 3.3.2-46 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL POOL COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Pools Cooling Pumps	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Fuel Pools Heat Exchanger Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.A3-3 (A-63)	3.3.1-48	B, 339
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	C, 339

TABLE 3.3.2-46 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL POOL COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Pools Heat Exchanger Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry			J
			Treated Water (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.C2-3 (AP-63)	3.3.1-52	D
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J
Piping, piping components, and piping elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Concrete (Outside)	None	None	VII.J-17 (AP-19)	3.3.1-96	A
System strainers	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
	M-2	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A, 341

TABLE 3.3.2-47 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL POOL CLEANUP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-47 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL POOL CLEANUP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8 (AP-79)	3.3.1-91	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-48 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL CASK DECONTAMINATION AND SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-4 (AP-27)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 343
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-48 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT FUEL CASK DECONTAMINATION AND SPRAY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Treated Water (Inside)	Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.F-18 (SP-55)	3.4.1-35	D
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 343
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 343
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-49 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SPENT RESIN STORAGE AND TRANSFER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-17 (AP-79)	3.3.1-91	E
				Cracking due to SCC	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.E1-20 (AP-82)	3.3.1-90	E
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-50 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT AUXILIARY EQUIPMENT

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Silicone Fluid (Inside)	None	None			J, 301
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-51 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT LINER PENETRATION AUXILIARY EQUIPMENT

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 308
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 308
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-51 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT LINER PENETRATION AUXILIARY EQUIPMENT

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 308
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VII.G-13 (A-47)	3.3.1-84	D, 308
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 307
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 308
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-52 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-4 (AP-40)	3.3.1-59	C, 309

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E
Fan Housings	M-1	Aluminum or Aluminum Alloys	Air/Gas (Wetted) (Inside)	None	None			J, 394
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J

TABLE 3.3.2-52 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings (continued)	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309

TABLE 3.3.2-53 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT VACUUM RELIEF SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT VACUUM RELIEF SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Containment Vacuum Relief Accumulator Tank	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT VACUUM RELIEF SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT VACUUM RELIEF SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716

TABLE 3.3.2-53 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT VACUUM RELIEF SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-54 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT PRESSURIZATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air - Indoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)		J
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-54 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT PRESSURIZATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.H2-21 (A-23)	3.3.1-71	C
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-55 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION PRESSURIZATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self- loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-55 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PENETRATION PRESSURIZATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection	VIII.G-34 (SP-60)		G, 338
			Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8	3.3.1-91	C, 342
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.A3-8	3.3.1-91	C, 342

TABLE 3.3.2-56 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Fan Cooler - Cooling Coil	M-5	Copper Alloy <15% Zn	Raw Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Open-Cycle Cooling Water System	VII.C1-6 (A-72)	3.3.1-83	C, 706
			Air/Gas (Wetted) (Outside)	None	None			J, 721
Containment Fan Cooler - Housing	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	A, 714
			Air/Gas (Wetted) (Outside)	None	None			J, 721
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Containment Fan-Coil - Housing	M-1	Copper Alloy <15% Zn	Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Open-Cycle Cooling Water System	VII.C1-3 (A-65)	3.3.1-82	A, 714
			Air/Gas (Wetted) (Outside)	None	None			J, 721

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Fan-Coil - Housing (continued)	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Flow restricting elements	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
	M-3	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-56 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-57 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIRBORNE RADIOACTIVITY REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394

TABLE 3.3.2-57 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIRBORNE RADIOACTIVITY REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-57 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIRBORNE RADIOACTIVITY REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Filter Housings	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394

TABLE 3.3.2-57 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AIRBORNE RADIOACTIVITY REMOVAL SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-58 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-14 (AP-74)	3.3.1-27	E
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Containment isolation piping and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716

TABLE 3.3.2-58 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment isolation piping and components (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
Containment Purge Cooling Coil Housing	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 727, 716
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-58 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air/Gas (Wetted) (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)		H, 701
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394

TABLE 3.3.2-58 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-58 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Filter Housings	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A, 716

TABLE 3.3.2-58 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT ATMOSPHERE PURGE EXHAUST SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A, 394
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-59 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL ROD DRIVE MECHANISM VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-59 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL ROD DRIVE MECHANISM VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-59 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONTROL ROD DRIVE MECHANISM VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RDCS Screens	M-2	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-60 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SHIELD AND REACTOR SUPPORTS COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 716, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 716, 394
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-60 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – PRIMARY SHIELD AND REACTOR SUPPORTS COOLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F3-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F3-5 (A-73)	3.3.1-34	E
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F3-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F3-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-61 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Galvanized Steel	Air/Gas (Wetted) (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 701
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-4 (AP-40)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components (continued)	M-1	Elastomers	Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E
Fan Housings	M-1	Aluminum or Aluminum Alloys	Air/Gas (Wetted) (Inside)	None	None			J, 394
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter Housings	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J
				Loss of Material due to Microbiologically Influenced Corrosion (MIC)	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.C1-15 (A-54)		H
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-61 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air/Gas (Wetted) (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2-18 (AP-55)	3.3.1-80	E, 715
Reactor Auxiliary Building Non Safety related Cooling Coil Housings	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Reactor Auxiliary Building Safety related Cooling Coil Housings	M-1	Copper Alloy <15% Zn	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 722
			Air/Gas (Wetted) (Outside)	None	None			J, 721
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Reactor Auxiliary Building Safety related Cooling Coils	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B, 706
			Air/Gas (Wetted) (Outside)	None	None			J, 721

TABLE 3.3.2-62 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394

TABLE 3.3.2-62 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
		Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-62 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E
Emergency Service Water Intake Structure Cooling Coil Enclosures	M-1	Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A

TABLE 3.3.2-62 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER INTAKE STRUCTURE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Filter Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Wet-ted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
		Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-63 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Damper Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-63 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Galvanized Steel	Air/Gas (Wetted) (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 701
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-63 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting (continued)	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-4 (AP-40)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-63 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
Filter Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-63 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Wet-ted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-64 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Cooling Coil Housing	M-1	Galvanized Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727

TABLE 3.3.2-64 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Galvanized Steel	Air/Gas (Wetted) (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 701
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394

TABLE 3.3.2-64 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-4 (AP-40)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E

TABLE 3.3.2-64 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Filter Housings	M-1	Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
MCC & Instrument Rack Area Cooling Coil Housing	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A

TABLE 3.3.2-64 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
MCC & Instrument Rack Area Cooling Coil Housing (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Copper Alloy <15% Zn	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 722
			Air/Gas (Wetted) (Outside)	None	None			J, 721
		Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394

TABLE 3.3.2-64 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
MCC & Instrument Rack Area Cooling Coil	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B, 706
			Air/Gas (Wetted) (Outside)	None	None			J, 721
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-65 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Cooling Coil Housing	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A

TABLE 3.3.2-65 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Cooling Coil Housing (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-65 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E

TABLE 3.3.2-65 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Filter Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-65 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-66 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL TRANSFER PUMP HOUSE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
Damper Housings	M-1	Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394

TABLE 3.3.2-66 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL TRANSFER PUMP HOUSE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F4-5 (A-18)	3.3.1-34	E

TABLE 3.3.2-66 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL OIL TRANSFER PUMP HOUSE VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components (continued)	M-1	Elastomers	Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F4-6 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F4-4 (A-73)	3.3.1-34	E
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F4-2 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-67 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components (continued)	M-1	Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-6 (A-18)	3.3.1-34	E

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Elastomer seals and components (continued)	M-1	Elastomers	Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F2-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	External Surfaces Monitoring	VII.F2-5 (A-73)	3.3.1-34	E
Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Galvanized Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Filter Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F2-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F2-8 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
		Stainless Steel	Air/Gas (Wet-ted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Flow restricting elements	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	Flow Blockage due to Dust Buildup	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			H, 701
				None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 394

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
	M-3	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 394
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Fuel Handling Building Normal Supply - Cooling Coil Housing	M-1	Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Fuel Handling Building Pump Room Cooling Coil	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F2-10 (AP-80)	3.3.1-52	B, 706
			Air/Gas (Wetted) (Outside)	None	None			J, 721

TABLE 3.3.2-67 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING HVAC SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Handling Building Pump Room Cooling Coil Housing	M-1	Copper Alloy <15% Zn	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 722
			Air/Gas (Wetted) (Outside)	None	None			J, 721
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

TABLE 3.3.2-68 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TECHNICAL SUPPORT CENTER VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting and components	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A

TABLE 3.3.2-69 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MECHANICAL COMPONENTS IN ELECTRICAL SYSTEMS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
230KV Switchyard System								
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Cable Oil (Inside)	None	None			J, 304
			Air - Outdoor (Outside)	None	None			J, 303
		Stainless Steel	Cable Oil (Inside)	None	None			J, 304
			Air - Outdoor (Outside)	None	None			J, 303
Tanks	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 305
			Cable Oil (Inside)	None	None			J, 304
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C

TABLE 3.3.2-69 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MECHANICAL COMPONENTS IN ELECTRICAL SYSTEMS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Gross Failed Fuel Detection System								
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-2 (A-102)	3.3.1-89	A
				Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B
		Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Galvanic Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D, 377

TABLE 3.3.2-69 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MECHANICAL COMPONENTS IN ELECTRICAL SYSTEMS

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 309
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-10 (A-79)	3.3.1-89	A, 377
		Stainless Steel	Treated Water (Inside)	Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	C, 378
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
				Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VII.E1-17 (AP-79)	3.3.1-91	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-10 (A-52)	3.3.1-50	D
				Cracking due to SCC	Closed-Cycle Cooling Water System	VII.C2-11 (AP-60)	3.3.1-46	D

TABLE 3.3.2-70 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST-ACCIDENT HYDROGEN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Hydrogen Analyzer Tubing and Valves	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A, 381
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components			J, 383
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Hydrogen Recombiners	M-1	Nickel Base Alloys	Air - Indoor (Inside)	None	None	VII.J-14 (AP-16)	3.3.1-94	C
			Air - Indoor (Outside)	None	None	VII.J-14 (AP-16)	3.3.1-94	C
		Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C
Remote Sample Dilution Panel Pump	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A, 381
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-70 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST-ACCIDENT HYDROGEN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Remote Sample Dilution Panel Refrigeration Unit	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 382
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Remote Sample Dilution Panel Sample Cooler	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 382
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Remote Sample Dilution Panel Sample Cooler Tubes	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 383
			Treated Water (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 382

TABLE 3.3.2-70 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST-ACCIDENT HYDROGEN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Remote Sample Dilution Panel Tubing and Valves	M-1	Aluminum or Aluminum Alloys	Air - Indoor (Inside)	None	None	VII.J-1 (AP-36)	3.3.1-95	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-2 (AP-37)	3.3.1-97	A
			Air - Indoor (Outside)	None	None	VII.J-1 (AP-36)	3.3.1-95	A
		Copper Alloy >15% Zn	Air - Indoor (Inside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C
			Air/Gas (Dry) (Inside)	None	None	VII.J-3 (AP-8)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	C, 700
		Galvanized Steel	Air - Indoor (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-22 (AP-4)	3.3.1-98	A
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A

TABLE 3.3.2-70 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – POST-ACCIDENT HYDROGEN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Remote Sample Dilution Panel Tubing and Valves	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air/Gas (Dry) (Inside)	None	None	VII.J-18 (AP-20)	3.3.1-98	A, 381
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components			J, 383
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Closure bolting	M-1	Stainless Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)		F
Containment isolation piping and components	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 384
Piping, piping components, and piping elements	M-1	Stainless Steel	Air - Indoor (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

TABLE 3.3.2-71 AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bird Screens	M-2	Aluminum or Aluminum Alloys	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring			J
		Galvanized Steel	Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 309
		Stainless Steel	Air - Outdoor (Outside)	None	None	VII.J-15 (AP-1 7)	3.3.1-94	C, 395
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VII.I-5 (AP-26)	3.3.1-45	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VII.I-4 (AP-27)	3.3.1-43	B

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Room Smoke Purge and Exhaust Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-1 7)	3.3.1-94	C, 394
Control Room Air Handling Unit and Emergency Filtration Unit Enclosure	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Room Air Handling Unit and Emergency Filtration Unit Enclosure (continued)	M-1	Copper Alloy <15% Zn	Treated Water (Inside)	Loss of Material due to Galvanic Corrosion	Closed-Cycle Cooling Water System	VII.C2-4 (AP-12)	3.3.1-51	D, 722
			Air/Gas (Wetted) (Outside)	None	None			J, 721
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None			J, 727
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-1 7)	3.3.1-94	C, 394
Control Room Air Handling Unit and Emergency Filtration Unit Fan Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Room Air Handling Unit and Emergency Filtration Unit Filter Housings	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
		Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-1 7)	3.3.1-94	C, 394
Control Room Air Handling Unit Cooling Coil	M-5	Copper Alloy <15% Zn	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Closed-Cycle Cooling Water System	VII.F1-12 (AP-80)	3.3.1-52	B, 706
			Air/Gas (Wetted) (Outside)	None	None			J, 721

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting	M-1	Galvanized Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-6 (AP-13)	3.3.1-92	A, 394
			Air - Indoor (Outside)	None	None	VII.J-6 (AP-1 3)	3.3.1-92	A, 394
Ducting and components	M-1	Carbon or Low Alloy Steel	Air/Gas (Wetted) (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-3 (A-08)	3.3.1-72	A
			Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F1-10 (AP-41)	3.3.1-59	C, 309
		Galvanized Steel	Air - Indoor (Outside)	None	None	VII.J-6 (AP-1 3)	3.3.1-92	A, 394
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	C, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-1 7)	3.3.1-94	C, 394

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Ducting closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.F4-7 (AP-41)	3.3.1-59	C, 309
Elastomer seals and components	M-1	Elastomers	Air/Gas (Wetted) (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-7 (A-17)	3.3.1-11	E
				Loss of Material due to Wear	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VII.F1-6 (A-18)	3.3.1-34	E
			Air - Indoor (Outside)	Loss of Material due to Wear	External Surfaces Monitoring	VII.F1-5 (A-73)	3.3.1-34	E
				Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VII.F1-7 (A-17)	3.3.1-11	E

TABLE 3.3.2-71 (continued) AUXILIARY SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION - CONTROL ROOM AREA VENTILATION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Wetted) (Inside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
			Air - Indoor (Outside)	None	None	V.F-3 (EP-10)	3.2.1-53	C, 394
		Stainless Steel	Air/Gas (Wetted) (Inside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394
			Air - Indoor (Outside)	None	None	VII.J-15 (AP-17)	3.3.1-94	A, 394

Notes for Tables 3.3.2-1 through 3.3.2-68:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.

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:

301. The silicone fluid is the capillary fluid for the instrumentation. This fluid is controlled to preclude the introduction of contaminants. The design of the component inherently resists the intrusion of water. Therefore, the environment is considered benign to stainless steel.

302. The equipment represented by this line item is associated with the CCW Drain and Holdup Tanks. The frequency of inspection will be based on the result of the first inspection to be done prior to the period of extended operation. The period between inspections will not exceed 10 years.

303. The HNP methodology determined that there are no aging effects for this material in an outdoor environment when it is not exposed to an aggressive environment (near the seashore or an industrial location).

304. Prior to introduction into the system, the cable oil is degassified and assured to be free from moisture by means of a vacuum pump. In the absence of water contamination and water pooling, this environment is considered benign for this material. Page IX-17 of NUREG-1801 states: "Piping, piping components, and piping elements, whether copper, stainless steel, or steel, when exposed to lubricating oil that does not have water pooling, will have limited susceptibility to aging degradation, due to general or localized corrosion."

305. The gas used in this application is nitrogen.

306. The Diesel Driven Fire Pump Fuel Oil Storage Tank is a small insulated tank that is not supported in accordance with NUREG-1801 criteria for an above ground tank. Therefore, it is not appropriate to use the Aboveground Steel Tanks Program (XI.M29) for aging management.

307. This environment is applicable to the instrument and drain valves associated with the Personnel Air Lock instrumentation.

308. The environment represents a fire-resistant hydraulic fluid. The fluid is a balanced formulation of a glycol-water base thickened with a water-soluble lubricant. It contains additives to improve lubrication properties and provide resistance to both liquid- and vapor-phase corrosion.

309. Humidity control is normally not assumed for the Air - Indoor and Air - Outdoor service environments. In these service environments, the HNP AMR methodology for steel (surface temperature < 212°F) always predicts general, crevice, and pitting corrosion. For PWRs, NUREG-1801 manages loss of material on the external surfaces of steel components with XI.M36, External Surfaces Monitoring Program. In some instances, NUREG-1801 lists general, crevice, and pitting corrosion as applicable aging mechanisms (AP-41); and, in other cases, only general corrosion (E-26, E-35, E-44, A-80, A-10, A-105, A-77, and S-29) is listed. The program description in Section XI of NUREG-1801 states: "This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual examination of external surfaces for evidence of material loss."

310. Not used.

311. The Site Fire Water System is the normal make-up source for the non-essential chilled water surge tank. The fire water system uses lake water which is a potential source of MIC. The Closed-Cycle Cooling Water Program manages this potential aging mechanism through testing for aggressive bacteria. If aggressive bacteria are detected, then actions to address this condition would be taken, for example, the addition of a biocide or internal inspection of piping components.

312. The fuel transfer tube bolting is fabricated from SB164 Grade 400.

313. Not used.

314. The Emergency Service Water system is the source of emergency makeup water for the Essential Services Chilled Water System surge tank. During surveillance testing, the service water supply valve is tested and represents a potential source of MIC to the system. The Closed-Cycle Cooling Water Program manages this potential aging mechanism through testing for aggressive bacteria. If aggressive bacteria are detected, then actions to address this condition would be taken, for example, the addition of a biocide or internal inspection of piping components. The air space inside of the surge tank is evaluated as a wetted air environment with a source of MIC. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is being used to manage Loss of Material in the wetted air space of the tank.

315. The HNP AMR methodology assumes that lubricating oil is contaminated by water intrusion or from condensation with separation and pooling of the water. This conservative assumption results in predicting selective leaching as a potential aging mechanism for the subject material.

316. The R-12 refrigerant inside the cooler and condenser tubes is free of contaminants and modeled as a dry commercial gas. A review of the vendor manual reveals the only potential for heat transfer fouling on the refrigerant side of the tubes is from oil intrusion, which is an event driven effect and not caused by an aging mechanism.

317. These Lubricating Oil Cooler Tubes are made of a copper alloy, and the tubesheet and other internal components are made of carbon steel. Since the HNP AMR methodology assumes water contamination in the lubricating oil, it follows that the potential for galvanic corrosion is predicted.

318. Flow blockage due to general corrosion in small bore stagnant carbon steel piping in raw water was identified at HNP during review of operating experience. Flushing or replacement of these piping sections or components is an activity included in the Open-Cycle Cooling Water System Program.

319. The insulation material is Fiberglass or Mineral Fiber.

320. The HNP AMR methodology concluded that glass in a refrigerant environment has no aging effects. A review of site OE and field observations show no aging effects for the site glass currently installed in the Essential Chilled Water Cooler shell.

321. The HNP AMR methodology concluded that stainless steel in an Air / Gas (wetted) environment without concentration of contaminants has no aging effects. This item consists of potentially moist service air connected to the airspace of the Essential Services Chilled Water System surge tank. The piping is connected to the top of the tank and has no direct connection to the chilled water. Based on this configuration, it is concluded that there is no source contaminants such as chlorides or sulfides.
322. These lines represent various submerged components having closure bolting (carbon steel and stainless steel as applicable), e.g. ESW pumps casing and valve flanges on submerged butterfly valves in the ESW Cooling Tower Makeup Water Intake Structure and the ESW Screening Structure, submerged portions of the Fire Service Screen Wash Pump suction, and Cooling Tower Spray header bypass components.
323. The component group in this line includes the main Emergency Service Water pumps and the booster pumps. This line only applies to the booster pumps, which are located in the RAB.
324. The components represented by this line are located in areas of the plant that do not contain the potential for leakage of boric acid or caustics. For example, they are located in the ESW Cooling Tower Makeup Water Intake Structure or Screening Structure.
325. These lines represent instrument air hose connected to air operators in various locations. For those in areas that may exceed 95°F for extended periods, the HNP methodology predicts aging effects requiring management. No aging effects are predicted for those areas where this criterion is not normally exceeded.
326. The material per the specification for freeze protection is glass fiber, mineral wool, or refractory fiber insulation. This component and material is not addressed in NUREG-1801.
327. This program is equally capable of managing loss of preload for carbon steel and stainless steel bolting.
328. The HNP AMR methodology concluded that the concentration of contaminants on the surface of components in an Air - Indoor (uncontrolled) environment is not high enough to result in aging effects for stainless steel, copper and copper alloys, or aluminum and aluminum alloys.
329. Like NUREG-1801, the HNP methodology predicts selective leaching for gray cast iron in raw water, soil, closed-cycle cooling water and treated water environments. In addition, the HNP methodology predicts the potential aging effects/mechanisms of loss of material due to general, crevice and pitting corrosion. NUREG-1801, Chapter IX, defines steel as including cast iron and gray cast iron. These aging mechanisms are consistent with steel in a water or soil environment. Similarly for copper with zinc content greater than 15%, HNP methodology predicts pitting and crevice corrosion in addition to selective leaching. In both cases, the electrolytic environment that produces selective leaching is also a requisite for pitting and crevice corrosion, and, in the case of steel or iron, general corrosion.
330. The material in this group consists of a copper alloy with a zinc content greater than 15% or with an aluminum content greater than 8%. In a raw water environment, HNP methodology predicts the same aging effects and mechanisms.
331. NUREG-1801 does not identify galvanic corrosion for this component, material and environment. The stainless steel bellows of the submerged expansion joint is welded to a pipe flange. Per OE, the degraded coating resulted in thru-wall leakage of the bimetallic weld. Repair and replacement with an improved coating was made.
332. Not used.
333. For HNP, the component, Letdown Heat Exchanger, is considered equivalent to the non-regenerative heat exchanger in NUREG-1801.
334. NUREG-1801, Item VII.E1-8 requires an augmented inspection to detect cracking. This inspection is based upon the combined aging effects of cyclic loading and SCC. The HNP methodology does not identify stress corrosion cracking as an aging mechanism for the closure bolting. The CSIP closure bolting is not considered high-strength bolting. Based on this, the CSIP closure bolting does not require SCC as an aging mechanism, and the Bolting Integrity Program does not require augmentation by a One-Time Inspection.

335. This commodity group includes tubes and/or tubesheet. The tube/tubesheet tubeside surface is identified as the "inside" surface. Tube/tubesheet shellside surface is identified as the "outside" surface.
336. This commodity group includes components supplied by the Demineralized Water System.
337. The system contains piping located in the RAB and the TB. The aging effect is for piping located in the RAB.
338. This item is associated with Equipment Hatch test piping. This piping is normally capped and not connected to Instrument Air. The piping normally contains Indoor Air which is not humidity controlled. This piping is not expected to exhibit aging effect/mechanisms, since it is not exposed to significant amounts of moisture or boric acid. This piping will be a good indicator of the condition of other carbon steel piping which is not continuously connected to an Instrument Air environment, but is not in contact with moisture or boric acid.
339. The Spent Fuel Pool Heat Exchangers have treated borated water inside the tubes and component cooling water in the shell.
340. Not used.
341. No preventive maintenance activity was identified to clean the strainers. HNP procedures identify that strainers should be cleaned when the associated pressure differential switch reaches 10 psid or an alarm is received on the associated panel.
342. This item represents the Fuel Transfer Tube leak test connection which is located in the Containment Building. During floodup of the Refueling Cavity, the test piping environment is treated borated water on the internal and external surface.
343. This system is no longer in service, but it was originally filled with demineralized water. An aging effect is not expected to occur, but the data is insufficient to rule it out with reasonable confidence.
344. This item represents components located in the Diesel Generator Building with no aging effects of external surfaces.
345. This commodity group includes components wetted by CCW and components wetted by borated water. Therefore, both the Closed-Cycle Cooling Water Program and the Water Chemistry Program are applied.
346. This commodity group represents backflushable filters. Flow blockage due to fouling has not been identified as an aging effect/mechanism. Fouling is an expected service condition that does not result directly from age-related degradation. The stainless steel strainers are equipped with differential pressure transmitters that provide a signal to alarming annunciators. If the filter becomes clogged, actions are taken to backflush the filter.
347. This commodity represents the three Charging Pump Miniflow Strainers. Flow blockage due to fouling has not been identified as an aging effect/mechanism. The miniflow line flow is checked on a quarterly interval during ISI required pump tests. Therefore, flow blockage due to fouling is not an aging effect/mechanism requiring management.
348. A review of the Potable Water System determined that components in the system are exposed to a relatively benign environment. The review identified a lack of adverse plant operating experience. In addition, aging effects are expected to progress slowly and predictably. Based on the review, the One-Time Inspection Program is considered to be appropriate for aging management of these components.
349. Not used.
350. The HNP methodology predicts MIC for this material and environment combination; whereas, NUREG-1801 does not predict it. The Fire Water System Program, XI.M27, in NUREG-1801 manages this aging effect/mechanism for other materials using methods compatible with this component and material.

351. NUREG-1801 lists selective leaching an the only aging mechanism for gray cast iron in raw water, soil, closed-cycle cooling water and treated water environments. With regard to the set of potential aging mechanism, gray cast iron may be evaluated as steel with the additional potential for selective leaching. At HNP, gray cast iron is subjected to more environments than those in the NUREG, e.g. Air - Indoor and Air - Outdoor. In these cases, HNP methodology predicts the potential aging effect/mechanisms of loss of material due to general, crevice and pitting corrosion. Additionally, selective leaching would only be predicted, if the component were subjected to prolonged wetting with the possibility to concentrate contaminants.
352. A significant portion of the Diesel Driven Fire Pump fuel oil supply line is made of copper tubing. This material in fuel oil is not susceptible to pitting or crevice corrosion. The NUREG-1801 Fire Protection Program makes special mention of ensuring fuel oil supply to this pump, therefore, it is selected in addition to the Fuel Oil Chemistry Program.
353. The aging effects for elastomer hoses are driven by temperature (T>95°F) and not the chemistry of the fluid medium. This is a standby system and temperature is usually maintained above 95°F by the keep warm subsystems. Since the external heat transfer mechanism is natural convection and minimal, it is reasonable to conclude that the aging effects on the external surface are representative of those on the internal surface. Consequently, aging management can be done by external examination.
354. These components are located within the outdoor diesel enclosure protected from weather.
355. The heat exchanger is an integral part of the Diesel Driven Fire Pump right-angle reduction gear case. A sight glass is located in the case and serves as the oil level gage.
356. These AMR lines are associated with the vent piping and appurtenances in the air space of the Diesel Driven Fire Pump Fuel Oil Storage Tank.
357. The "dry" sprinkler header components are periodically wetted with raw water, drained, and are maintained in a moist air environment. Consequently, the HNP AMR methodology considers that the potential exists to concentrate contaminants. Under these conditions the Air/Gas (wetted) environment produces aging effects similar to that in a raw water environment.
358. NUREG-1801 lists selective leaching for gray cast iron and copper with zinc content greater than 15% in raw water, soil, closed-cycle cooling water and treated water environments. HNP conservatively takes the position that, since internal surfaces are periodically wetted with raw water and then remain in a moist air environment, selective leaching and MIC are potential aging mechanism.
359. These heat exchanger components are associated with the Diesel Driven Fire Pump and right angle, speed reducing gear. The Fire Water System program manages these aging effects by monitoring system performance.
360. The components on this line involve the operation of the automatic sprinkler valves. NUREG-1801 lists the Fire Protection Program for managing these aging effects in similarly named components. In the NUREG-1801 program description of the Fire Protection Program (XI.26), there is no mention of how this is accomplished. However, the Fire Water System Program (XI.27) program description in NUREG-1801 discusses how loss of material is managed in the Fire Water System. Therefore, HNP proposes to use this program to manage these aging effects.
361. The HNP AMR methodology assumes that Fuel Oil and Lubricating Oil are contaminated with water. Therefore, the HNP evaluation will predict selective leaching as a potential aging mechanism for the subject material.
362. This AMR line represents the fuel oil supply to the Diesel Driven Fire Pump. The HNP methodology predicts no aging effects for copper tubing in an Air - Outdoor environment. HNP is not near enough to any industrial facility or salt water environment such that weather or process system leakage would have the potential to concentrate contaminants. For the purposes of alignment to NUREG-1801, the Air - Outdoor environment is considered to be similar to Air - Indoor (uncontrolled) described on Page IX-14 of NUREG-1801.
363. Not used.

364. Loss of preload in Air - Outdoor is not listed in NUREG-1801. The HNP methodology predicts this potential aging effect for closure bolting in all HNP material and environment combinations.
365. This AMR line represents a portion of the fuel oil supply line to the Diesel Driven Fire Pump, which is managed by the Fire Protection system to ensure flow to the diesel engine. The HNP AMR methodology predicts the possibility of MIC in steel, stainless steel, aluminum, and copper in fuel oil. NUREG-1801 also predicts MIC as an applicable aging mechanism in steel fuel oil piping in Section VII.H1-10. The Fuel Oil Chemistry Program was added to manage MIC, which is consistent with VII.H1-10.
366. Not used.
367. This item is associated with carbon steel piping delivering auxiliary steam to and from the Boric Acid Batching Tank.
368. This item is associated with the closed-cycle chilled water loop used for the BTRS Chiller. Pipe segments for the BTRS Chiller are in the CVCS.
369. An aging effect is not expected to occur, but the data is insufficient to rule it out with reasonable confidence. Therefore, a one-time inspection will provide assurance the aging mechanism is not occurring.
370. This line item includes instrumentation air (control air) components. The air is dry and oil-free.
371. Not used.
372. This line item represents piping components in the BTRS chilled water loop.
373. Components located in sumps include pump casings, strainers, and pump discharge piping. These components may be inaccessible during system walkdowns, and so the external surfaces of these components will be inspected at the same time as the internal surfaces for the components located in sumps.
374. Item represents oil drain piping connected to the Reactor Coolant Pump and Motor.
375. This system provides drainage of reactor grade water from equipment leaks, drains, and tank overflows in the WPB, RAB, FHB, Tank Area/Building, and Containment Building; therefore, treated water was chosen as the environment. Based on plant conditions and operating experience, aging effects are expected to progress very slowly in this treated water environment, but the environment may be more adverse than generally expected.
376. This line item represents components associated with the BTRS Chiller Condenser wetted by service water (raw water). These components are non-safety related; and, therefore, cannot be managed using the Open-Cycle Cooling Water Program.
377. This line item represents shell-side carbon steel components of the sample cooler. These components are wetted internally by component cooling water.
378. Since this line item represents components performing a safety related function and there is operating experience that identifies SCC in RCS sample tubing, a one-time inspection will be used to verify the absence of cracking.
379. The subject components are exposed to a moisture-laden air/gas and/or an intermittently wetted environment.
380. The subject components include a sample line from the RWST to a sample sink.
381. These components are exposed to an internal environment of dry instrument air or nitrogen. The NUREG-1801 alignment chosen (VII.J-18) is for dried air. VII.J-19 is also applicable.
382. This environment represents the chilled water loop from the Remote Sample Dilution Panel Refrigeration Unit to the Remote Sample Dilution Panel Sample Cooler.
383. This environment represents condensation collected downstream of the sample cooler. This environment does not have a source of MIC.

384. The insulation is associated with the heat tracing from Penetration M-73A to the Hydrogen Analyzer Cabinet. Based on site specifications the insulation is either fiberglass or mineral wool fiber. The HNP AMR methodology does not predict aging effects for these types of insulation in an Air - Indoor environment.
385. This line item represents primary sample chiller components in a refrigerant environment. The refrigerant has been evaluated as a gas.
386. This line item represents components in the closed-cycle chilled water loop of the primary sample chiller.
387. The flow straighteners are internal to the ductwork.
388. This AMR line represents sampling from the Auxiliary Steam Condensate System.
389. This AMR line represents sampling from the Boron Recycle System.
390. This AMR line represents sampling from various drains.
391. This AMR line represents sampling from the CCW System.
392. The subject sampling components are associated with the Waste Monitor Tanks.
393. The HNP AMR methodology concluded that copper alloy with zinc content greater than 15% in an Air / Gas (wetted) environment without concentration of contaminants has no aging effects.
394. This environment represents indoor air for systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.
395. HNP is not near enough to any industrial facility or salt water environment such that weather or process system leakage would have the potential to concentrate contaminants. Surface contaminants would not be in large enough quantities for significant concentrations to occur. Therefore, for the purposes of alignment to NUREG-1801, the Air - Outdoor environment is considered to be similar to the Air - Indoor (uncontrolled) described on Page IX-14 of NUREG-1801.
396. The temperature of the diesel exhaust piping and the combustion air intake expansion joint and portion of the intake piping that are connected to the turbocharger exceed the temperature threshold for consideration of thermal fatigue as an aging mechanism. The stainless steel components are part of the expansion joints on the diesel exhaust and intake piping.
397. The temperature exceeds the temperature threshold of 140°F used by HNP methodology for predicting Cracking due to Stress Corrosion Cracking in stainless steel. HNP methodology evaluated the environment shown with water being present.
398. The fuel oil day tanks are elevated, indoor tanks with access to all exterior surfaces.
399. A flame arrestor element requires periodic cleaning to assure proper functioning.
700. This commodity is not exposed to boric acid leakage as it is inside the Remote Sample Dilution Panel.
701. Plant-specific OE indicates that there are instances of dust buildup on these components. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is used to detect and ameliorate this condition.
702. This AMR line represents fuel oil hoses connecting sections of the fuel oil supply and return line that transfers oil between the buried, main storage tank and the fuel oil day tank. They are connected to the tank and protected by an access cover on the concrete slab above the storage tank. The environment selected to represent this area is a cool, damp air space. Cool temperatures (< 95°F) in this air space ensure no aging effects for the hoses.
703. This component is the radiator fan housing. The fan housing conducts the forced air through the radiator directly into the room exhaust ducting. The exhaust ducting is part of the Security Building HVAC System.
704. This line item represents a component exposed internally to gas samples.

705. Not used.
706. This line item describes the cooling coil heat transfer function associated with inside surface of the cooling coil commodity.
707. In addition to the tubing, piping, valves, and fittings, the WPB Cooling Water heat exchanger is included in this component commodity. The pressure boundary of this heat exchanger has copper alloy cladding on its internal carbon steel surfaces for corrosion protection. The connected piping, e.g., raw water and treated water inlets, outlets, vents, drains, and sensing lines, are made of carbon steel. Due to the dissimilar metals, galvanic corrosion is conservatively assigned to all material and internal environment combinations. The non-safety related, raw water inlet and outlet piping is evaluated in the service water system. The raw water vents drains and sensing lines are included in this evaluation.
708. The line item includes equipment within the control room envelope, which is a humidity controlled indoor air environment. HNP methodology predicts no aging effects for carbon steel exposed to this environment as long as the metal temperature remains above the dew point.
709. This line item represents the surfaces above the water level in the surge tank; aging effects may be managed as part of the inspection activities associated with this program.
710. Not used.
711. Not used.
712. Flow Blockage due to general corrosion in small-bore carbon steel piping in stagnant raw water was identified at HNP during review of operating experience. Flushing or replacement of these piping sections or components are performed, as necessary, in non-safety related components.
713. This line represents the air intake filter of the diesel driven fire pump engine which is routinely maintained by periodic maintenance. The filter contains an oil bath, which uses a synthetic engine lubricating oil. This application is susceptible to contamination, which is not controlled by analysis. Instead the contaminants are eliminated by cleaning the oil bath air cleaner base and replacement of the lubricating oil. As with any normal maintenance activity, if degradation is found, it would be evaluated. Depending on these findings, corrective actions would be taken. Inspection of internal surfaces during maintenance is consistent with the program selection and appropriate for managing this aging effect.
714. The aging effect determination for the cooling coil pressure boundary function is included with the cooling coil enclosure commodity.
715. The RAB HVAC Evaporative Cooler recirculation piping and components are exposed to raw water (service water) due to their location within the Evaporative Cooler. The internal environment is considered raw water, and the external environment is air/gas - wetted.
716. Alignments for piping and ducting may be considered equivalent components. This is supported by equivalencies in NUREG-1801, such as found in NUREG-1801, Section V.A-1.
717. This line item represents a flexible metal hose in the lubricating oil for the Diesel Driven Fire Pump engine. This hose is a Teflon hose with a stainless steel braided jacket. Teflon is a thermoplastic, and the HNP methodology predicts no aging effects in lubricating oil for this material.
718. These strainer elements are the bronze basket strainers installed on the inlet of the three fire pumps: the Motor Driven Fire Pump, the Diesel Driven Fire Pump, and the Jockey Pump.
719. This component group represents equipment in several different structures. Some structures have indoor air environments with the potential for borated water leakage and others do not. Aging management results from these environments are being reported.
720. The temperatures in the diesel exhaust piping exceed the temperature threshold for consideration of thermal fatigue as an implicit aging mechanism.
721. For the Cu < 15% Zn cooling coil exterior surface in these line items, no aging effects are predicted; because there is no mechanism to concentrate contaminants. Condensation is present but is drained away as it is formed on the cooling coil.

722. Other than galvanic corrosion, no other aging effects are predicted for the Cu < 15% Zn cooling coil interior surface and treated water (inside) M-1 intended function evaluation group, because the component material is not susceptible to loss of material due to corrosion and the environment does not promote cracking, erosion, MIC, or FAC.
723. This Air/Gas (Wetted) environment represents the air space inside the fuel oil tanks above the fuel oil level. The Fuel Oil Chemistry Program and One Time Inspection Program are appropriate because they include an inspection of the internal surfaces of the tank.
724. Erosion/Corrosion of the seal area on the ESW Booster Pump was identified during the review of site OE. The internal surfaces of the seal area and casing were coated to prevent further erosion. This aging effect/mechanism has been added to similar components based on this OE and is adequately managed by the program selected.
725. Water flow through the service water recirculation pumps are measured using flow elements. HNP procedures indicate the piping surrounding these flow elements as being periodically replaced. These flow elements are annubars and have no flow restricting function. The piping is carbon steel, small bore piping in stagnant flow regions.
726. This AMR line represents strainers in the non-safety related, demineralized water makeup supplies to the system expansion tanks. The filtration function is conservatively assumed to be required because the strainers are included in License Renewal based on their historical association with Fire Protection.
727. For the stainless steel cooling coil housing interior surface in these line items, no aging effects are predicted because there is no mechanism to concentrate contaminants. Condensation is present but is drained away as it is formed.
728. The buried tank is composed of an inner and outer tank. The exterior surface in contact with soil is made of a self-reinforcing resin (FibreThane) specifically formulated for use in the manufacture of composite storage tanks. The inner shell is steel with no coating. This Air/Gas (Wetted) environment represents the air space inside the fuel oil tanks above the fuel oil level and the air space between the tanks, which is accessible for inspection. The Fuel Oil Chemistry Program and One-Time Inspection Program are appropriate because they include an inspection of the internal surfaces of the tank.
729. This line represents an immersion heater whose configuration in the tank is such it would not credibly come in contact with water in the event of contamination or pooling. The HNP methodology predicts no aging affects in lubricating oil without water contamination.
730. Loss of preload in this environment is not listed in NUREG-1801. The HNP methodology predicts this potential aging effect for closure bolting in all HNP material and environment combinations.
731. The temperature in the diesel lubricating oil, carbon steel piping may exceed the temperature threshold for consideration of thermal fatigue as an implicit aging mechanism.
732. The RMWST includes a vent pipe. The internal surface of the vent pipe and the internal surface of the RMWST (above the diaphragm) are exposed to air-outdoor. This line item also represents the vent line.
733. Flow blockage due to fouling is not applicable for tanks.
734. The aging effects for elastomer hoses are driven by temperature ($T > 95°F$) and not the chemistry of the fluid medium. Since the external heat transfer mechanism is natural convection and minimal, it is reasonable to conclude that the aging effects on the external surface are representative of those on the internal surface. Consequently, aging management can be done by external examination.
735. These components interface with the NSW System between the cyclone separator and the NSW pumps. This area is in the NSW Intake Structure and is considered an outdoor environment. The internal environment is raw water because of the interface with NSW.
736. This line represents the site glass associated with starting air filters in the diesel engine starting air circuit downstream of the Starting Air Tanks.

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEMS

3.4.1 INTRODUCTION

Section 3.4 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.3.4, Steam and Power Conversion Systems, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Steam Generator Blowdown System (Subsection 2.3.4.1)
2. Steam Generator Chemical Addition System (Subsection 2.3.4.2)
3. Main Steam Supply System (Subsection 2.3.4.3)
4. Steam Dump System (Subsection 2.3.4.4)
5. Auxiliary Boiler/Steam System (Subsection 2.3.4.5)
6. Feedwater System (Subsection 2.3.4.6)
7. Feedwater Heater Drains & Vents System (As discussed in Subsection 2.3.4.7, this system contains no mechanical components/ commodities requiring aging management review.)
8. Auxiliary Feedwater System (Subsection 2.3.4.8)
9. Auxiliary Steam Condensate System (Subsection 2.3.4.9)
10. Condensate System (Subsection 2.3.4.10)
11. Condensate Storage System (Subsection 2.3.4.11)
12. Secondary Sampling System (Subsection 2.3.4.12)
13. Steam Generator Wet Lay Up System (Subsection 2.3.4.13)
14. Turbine System (Subsection 2.3.4.14)
15. Digital-Electric Hydraulic System (As discussed in Subsection 2.3.4.15, this system contains no mechanical components/ commodities requiring aging management review.)

16. Turbine-Generator Lube Oil System (As discussed in Subsection 2.3.4.16, this system contains no mechanical components/commodities requiring aging management review.)

Table 3.4.1, Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion Systems, provides the summary of programs evaluated in NUREG-1801 that are applicable to component/commodity groups in this Section. Table 3.4.1 uses the format of Table 1 described in Section 3.0 above.

3.4.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been predicted through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. Subsequent OE will be reviewed and applicable OE will be updated, as required, with the amendment to the application required by 10 CFR 54.21(b). The OE review consisted of the following:

Site: HNP site-specific OE has been captured by a review of the Action Tracking database and, as appropriate, a review of the System Engineering Notebooks and System Health Reports and discussions with Site engineering personnel. This effort also may have included a review of work management and leak log records, applicable correspondence (Licensee Event Reports, etc.), and Nuclear Assessment Section assessment records. The plant-specific OE review identified instances of general corrosion of carbon steel piping normally operating at temperatures above 212°F, in the Auxiliary Boiler/Steam and Auxiliary Steam Condensate Systems. This has been addressed in the AMR of those systems. Also, both plant and industry OE predicts loss of material for susceptible materials in contact with hydraulic fluid in the Main Steam Supply System.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience subsequent to the date of the aging management review continues to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.4.2 RESULTS

The following tables summarize the results of the aging management review for systems in the Steam and Power Conversion Systems area.

Table 3.4.2-1 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Blowdown System

Table 3.4.2-2 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Chemical Addition System

Table 3.4.2-3 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Steam Supply System

Table 3.4.2-4 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Dump System

Table 3.4.2-5 Steam and Power Conversion Systems – Summary of Aging Management – Auxiliary Boiler/Steam System

Table 3.4.2-6 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Feedwater System

Table 3.4.2-7 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Feedwater System

Table 3.4.2-8 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Steam Condensate System

Table 3.4.2-9 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate System

Table 3.4.2-10 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Condensate Storage System

Table 3.4.2-11 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Secondary Sampling System

Table 3.4.2-12 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Wet Lay Up System

Table 3.4.2-13 Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Turbine System

These tables use the format of Table 2 described in Section 3.0 above.

3.4.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they 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.

3.4.2.1.1 Steam Generator Blowdown System

Materials

The materials of construction for the Steam Generator Blowdown System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Stainless Steel

Environment

The Steam Generator Blowdown System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Steam Generator Blowdown System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Steam Generator Blowdown System components:

- Bolting Integrity Program

- Boric Acid Corrosion Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.2 Steam Generator Chemical Addition System

Materials

The materials of construction for the Steam Generator Chemical Addition System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn

Environment

The Steam Generator Chemical Addition System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Steam Generator Chemical Addition System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Steam Generator Chemical Addition System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program

3.4.2.1.3 Main Steam Supply System

Materials

The materials of construction for the Main Steam Supply System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Insulation
- PVC or Thermoplastics
- Stainless Steel

Environment

The Main Steam Supply System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Lubricating Oil or Hydraulic Fluid
- Radiation (Ultraviolet)
- Steam
- Treated Water

Aging Effects Requiring Management

The following Main Steam Supply System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Main Steam Supply System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program

- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.4 Steam Dump System

Materials

The materials of construction for the Steam Dump System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn

Environment

The Steam Dump System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Air/Gas (Dry)
- Steam
- Treated Water

Aging Effects Requiring Management

The following Steam Dump System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Steam Dump System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.5 Auxiliary Boiler/Steam System

Materials

The materials of construction for the Auxiliary Boiler/Steam System components are:

- Carbon or Low Alloy Steel

Environment

The Auxiliary Boiler/Steam System components are exposed to the following:

- Air - Indoor
- Air - Outdoor
- Steam
- Treated Water

Aging Effects Requiring Management

The following Auxiliary Boiler/Steam System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Auxiliary Boiler/Steam System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.6 Feedwater System

Materials

The materials of construction for the Feedwater System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Elastomers
- Nickel Base Alloys

- Stainless Steel

Environment

The Feedwater System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Feedwater System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Feedwater System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.7 Auxiliary Feedwater System

Materials

The materials of construction for the Auxiliary Feedwater System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Glass
- Stainless Steel

Environment

The Auxiliary Feedwater System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)

- Concrete
- Lubricating Oil or Hydraulic Fluid
- Steam
- Treated Water

Aging Effects Requiring Management

The following Auxiliary Feedwater System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer Effectiveness

Aging Management Programs

The following AMPs manage the aging effects for the Auxiliary Feedwater System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- Lubricating Oil Analysis Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.8 Auxiliary Steam Condensate System

Materials

The materials of construction for the Auxiliary Steam Condensate System components are:

- Aluminum or Aluminum Alloys
- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Glass
- Gray Cast Iron
- Stainless Steel

Environment

The Auxiliary Steam Condensate System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Treated Water

Aging Effects Requiring Management

The following Auxiliary Steam Condensate System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Auxiliary Steam Condensate System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Selective Leaching of Materials Program
- Water Chemistry Program

3.4.2.1.9 Condensate System

Materials

The materials of construction for the Condensate System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Condensate System components are exposed to the following:

- Air - Indoor
- Treated Water

Aging Effects Requiring Management

The following Condensate System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Condensate System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Flow-Accelerated Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.10 Condensate Storage System

Materials

The materials of construction for the Condensate Storage System components are:

- Carbon or Low Alloy Steel
- Stainless Steel
- Thermoplastic

Environment

The Condensate Storage System components are exposed to the following:

- Air - Indoor
- Air/Gas (Wetted)
- Treated Water

Aging Effects Requiring Management

The following Condensate Storage System aging effects require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Condensate Storage System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.11 Secondary Sampling System

Materials

The materials of construction for the Secondary Sampling System components are:

- Carbon or Low Alloy Steel
- Copper Alloy >15% Zn
- Glass
- Stainless Steel
- Thermoplastic

Environment

The Secondary Sampling System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Air/Gas (Wetted)
- Radiation (Ultraviolet)
- Treated Water

Aging Effects Requiring Management

The following Secondary Sampling System aging effects require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Secondary Sampling System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program
- External Surfaces Monitoring Program
- One-Time Inspection Program
- Water Chemistry Program

3.4.2.1.12 Steam Generator Wet Lay Up System

Materials

The materials of construction for the Steam Generator Wet Lay Up System components are:

- Carbon or Low Alloy Steel
- Stainless Steel

Environment

The Steam Generator Wet Lay Up System components are exposed to the following:

- Air - Indoor
- Air/Gas (Dry)
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following Steam Generator Wet Lay Up System aging effects require management:

- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following AMPs manage the aging effects for the Steam Generator Wet Lay Up System components:

- Bolting Integrity Program
- Boric Acid Corrosion Program
- External Surfaces Monitoring Program
- One-Time Inspection Program

3.4.2.1.13 Turbine System

Materials

The materials of construction for the Turbine System components are:

- Stainless Steel

Environment

The Turbine System components are exposed to the following:

- Air - Indoor
- Steam
- Treated Water

Aging Effects Requiring Management

The following Turbine System aging effects require management:

- Cracking
- Loss of Material

Aging Management Programs

The following AMPs manage the aging effects for the Turbine System components:

- One-Time Inspection Program
- Water Chemistry Program

3.4.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies aging management activities that warrant further evaluation. For the Steam and Power Conversion Systems, those activities are addressed in the following subsections.

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)(1). The evaluation of this TLAA is addressed separately in Section 4.3.

3.4.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

3.4.2.2.2.1 Steel Piping and Components Exposed to Treated Water and Steam

Loss of material due to general, pitting, and crevice corrosion could occur for steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water and for steel piping, piping components, and piping elements exposed to steam. However, Items 3.3.1-02 and 3.3.1-03 are not applicable. HNP manages piping components exposed to treated water with a combination of the Water Chemistry Program and the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.2.2 Steel Piping Components Exposed to Lubricating Oil

HNP manages piping components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

Note: The Main Steam Supply System power operated relief valves contain hydraulic fluid and not lubricating oil. However, components exposed to this hydraulic fluid are managed by the Lubricating Oil Analysis Program.

3.4.2.2.3 Loss of Material Due to General, Pitting, and Crevice, and Microbiologically-Influenced Corrosion (MIC), and Fouling

Loss of material due to general, pitting, crevice, and MIC, and fouling could occur in steel piping, piping components, and piping elements exposed to raw water. For HNP, the portions of the Auxiliary Feedwater System within the scope of license renewal are not exposed to raw water. Therefore, the aging effects and mechanisms are not applicable.

3.4.2.2.4 Reduction of Heat Transfer Due to Fouling

3.4.2.2.4.1 Heat Exchanger Tubes Exposed to Treated Water

Reduction of heat transfer due to fouling could occur for heat exchanger tubes exposed to treated water. HNP manages heat exchanger components exposed to treated water with a combination of the Water Chemistry Program and One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.4.2 Heat Exchanger Tubes Exposed to Lubricating Oil

Reduction of heat transfer due to fouling could occur for heat exchanger tubes exposed to lubricating oil. HNP manages Steam and Power Conversion System heat exchanger components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

Heat exchanger components from the Essential Services Chilled Water System, Emergency Diesel Generator System, Diesel Generator Lubrication System, Security Power System, and Fire Protection System have been aligned to this item based on material, environment, aging effect, and aging management programs.

3.4.2.2.5 Loss of Material Due to General, Pitting, Crevice and Microbiologically-Influenced Corrosion

3.4.2.2.5.1 Steel Piping Components and Tanks Exposed to Soil

The Auxiliary Feedwater System and Condensate System do not contain steel components exposed to soil. Therefore, this item is not applicable to HNP.

3.4.2.2.5.2 Steel Heat Exchanger Components Exposed to Lubricating Oil

The Auxiliary Feedwater System heat exchanger components are fabricated from stainless steel. See further evaluation for Subsections 3.4.2.2.4.1 and 3.4.2.2.4.2 above. Therefore, this item is not applicable to HNP.

3.4.2.2.6 Cracking Due to Stress Corrosion Cracking (SCC)

Cracking due to SCC could occur in stainless steel piping, piping components, and piping elements, tanks, and heat exchanger components exposed to steam or treated water greater than 140°F. HNP manages stainless steel piping components exposed to treated water with a combination of the Water Chemistry Program together with the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.7 Loss of Material Due to Pitting and Crevice Corrosion

3.4.2.2.7.1 Stainless, Aluminum, and Copper Alloy Components Exposed to Treated Water

HNP manages piping components and the Condensate Storage Tank exposed to treated water with a combination of the Water Chemistry Program together with the One-Time Inspection Program. The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking and loss of material aging effects. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

Piping components from the Boron Thermal Regeneration System, Demineralized Water System, Radiation Monitoring System, Steam Generator System, Radwaste Sampling System, and Refueling System have been aligned to this item based on material, environment, aging effect, and aging management programs.

3.4.2.2.7.2 Stainless Steel Piping Components Exposed to Soil

Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to soil. For HNP, the Auxiliary Feedwater and Condensate Systems do not contain stainless steel components exposed to soil. Therefore, this item is not applicable to HNP.

3.4.2.2.7.3 Copper Alloy Piping Components Exposed to Lubricating Oil

Loss of material due to pitting and crevice corrosion could occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. For HNP, the portions of the Condensate System, Feedwater System, Auxiliary Feedwater System, and Turbine System within the scope of license renewal do not contain copper alloy piping components exposed to lubrication oil. Therefore, this item is not applicable to HNP.

3.4.2.2.8 Loss of Material Due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

HNP manages Steam and Power Conversion System stainless steel piping and heat exchanger components exposed to lubricating oil with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. The Lubricating Oil Analysis Program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation.

3.4.2.2.9 Loss of Material Due to General, Pitting, and Crevice, and Galvanic Corrosion

HNP Condensate System heat exchanger components exposed to treated water are not within the scope of License Renewal. Therefore, this item is not applicable to HNP.

NUREG-1800 incorrectly refers to the further evaluation subsection as 3.4.2.2.2.9. Also, NUREG-1800 and NUREG-1801 incorrectly refer to this item number as applicable only to BWR plants.

3.4.2.2.10 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.4.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Steam and Power Conversion System components. The subsection of the application that contains the TLAA review results is indicated in parenthesis.

1. Cumulative Fatigue Damage (Section 4.3, Metal Fatigue)

3.4.3 CONCLUSIONS

The Steam and Power Conversion Systems components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Steam and Power Conversion Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.4.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-01	Steel piping, piping components, and piping elements exposed to steam or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is addressed as a TLAA in Section 4.3. Further evaluation is documented in Subsection 3.4.2.2.1.
3.4.1-02	Steel piping, piping components, and piping elements exposed to steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The portions of the Turbine System exposed to steam within the scope of license renewal are fabricated from stainless steel. The Extraction Steam System is not within the scope of license renewal. Further evaluation is documented in Subsection 3.4.2.2.2.1.
3.4.1-03	Steel heat exchanger components exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The portions of the Condensate System and the Steam Generator Blowdown System within the scope of license renewal do not contain heat exchanger components. Further evaluation is documented in Subsection 3.4.2.2.2.1.
3.4.1-04	Steel piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.2.1.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-05	Steel heat exchanger components exposed to treated water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item number is not applicable. Condensate System heat exchanger components are not within the scope of license renewal. Further evaluation is documented in Subsection 3.4.2.2.9.
3.4.1-06	Steel and stainless steel tanks exposed to treated water	Loss of material due to general (steel only) pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1.
3.4.1-07	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.2.2.
3.4.1-08	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling	Plant specific	Yes, plant specific	This item is not applicable. The portions of the Auxiliary Feedwater System within the scope of license renewal are not exposed to raw water.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-09	Stainless steel and copper alloy heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.4.1.
3.4.1-10	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with the Lubricating Oil Analysis Program and One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.4.2.
3.4.1-11	Buried steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	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	This item is not applicable. The Auxiliary Feedwater System and the Condensate System do not contain steel components exposed to soil. Further evaluation is documented in Subsection 3.4.2.2.5.1.
3.4.1-12	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice and micro-biologically-influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The Auxiliary Feedwater System heat exchanger components are fabricated from stainless steel. Further evaluation is documented in Subsection 3.4.2.2.5.2.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-13	BWR Only				
3.4.1-14	Stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.6.
3.4.1-15	Aluminum and copper alloy piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1. The Steam and Power Conversion Systems do not contain aluminum or copper alloy components exposed to treated water. However, the Boron Thermal Regeneration System and Demineralized Water System have been aligned to this item based on material, environment, aging effect, and aging management programs.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-16	Stainless steel piping, piping components, and piping elements; tanks, and heat exchanger components exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of the Water Chemistry Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.7.1. In addition, the Demineralized Water System, Radiation Monitoring System, Steam Generator System, Radwaste Sampling System, and Refueling System have been aligned to this item based on material, environment, aging effect, and aging management programs.
3.4.1-17	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	This item is not applicable. The Auxiliary Feedwater System and the Condensate System do not contain stainless steel components exposed to soil. Further evaluation is documented in Subsection 3.4.2.2.7.2.
3.4.1-18	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	This item is not applicable. The Steam and Power Conversion Systems do not contain copper alloy piping exposed to lubricating oil. Further evaluation is documented in Subsection 3.4.2.2.7.3.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-19	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. HNP manages the aging effect with a combination of the Lubricating Oil Analysis Program and the One-Time Inspection Program. Further evaluation is documented in Subsection 3.4.2.2.8.
3.4.1-20	Steel tanks exposed to air – outdoor (external)	Loss of material/ general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	This item is not applicable. The Steam and Power Conversion Systems do not contain steel tanks exposed to Air - Outdoor (external).
3.4.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable. The Steam and Power Conversion Systems do not contain high-strength steel closure bolting.
3.4.1-22	Steel bolting and closure bolting exposed to air with steam or water leakage, air – outdoor (external), or air – indoor uncontrolled (external);	Loss of material due to general, pitting and crevice corrosion; loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Bolting Integrity Program. The exception involves differences from the NUREG-1801 recommendations for Bolting Integrity Program implementation.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-23	Stainless steel piping, piping components, and piping elements exposed to closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for Closed-Cycle Cooling Water System Program implementation. This item is not applicable to the Steam and Power Conversion Systems at HNP. However, lube oil cooler components in the Security Power System have been aligned to this item based on material, environment, aging effect, and aging management program.
3.4.1-24	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-25	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for Closed-Cycle Cooling Water System Program implementation. This item is not applicable to the Steam and Power Conversion Systems at HNP. However, lube oil cooler components in the Security Power System have been aligned to this item based on material, environment, aging effect, and aging management program.
3.4.1-26	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-27	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exception. The aging effect is managed by the Closed-Cycle Cooling Water System Program. The exception involves differences from the NUREG-1801 recommendations for Closed-Cycle Cooling Water System Program implementation. This item is not applicable to the Steam and Power Conversion Systems at HNP. However, lube oil cooler components in the Security Power System have been aligned to this item based on material, environment, aging effect, and aging management program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-28	Steel external surfaces exposed to air – indoor uncontrolled (external), condensation (external), or air outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The aging effect is managed by the External Surfaces Monitoring Program. This item number applies to the Auxiliary Boiler/Steam System and Auxiliary Steam Condensate System that normally operate above 212°F. External corrosion of system piping has been observed in the field. The HNP AMR methodology for steel (surface temperature < 212°F) always predicts crevice and pitting corrosion in addition to general corrosion. The components in the Steam and Power Conversion System meeting this description have been aligned to Items 3.3.1-59 and 3.3.1-60 for the management of loss of material due to general, crevice, and pitting corrosion by the External Surfaces Monitoring Program.
3.4.1-29	Steel piping, piping components, and piping elements exposed to steam or treated water	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Flow-Accelerated Corrosion Program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-30	Steel piping, piping components, and piping elements exposed to air outdoor (internal) or condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Consistent with NUREG-1801. The aging effect is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.
3.4.1-31	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.
3.4.1-32	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.
3.4.1-33	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-34	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	This item is not applicable to the Steam and Power Conversion Systems at HNP.
3.4.1-35	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water, raw water, or treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801 with exceptions. The aging effect is managed for susceptible components by the Selective Leaching of Materials Program. The exception involves differences from the NUREG-1801 recommendations for Selective Leaching of Materials Program implementation. This item is not applicable to the Steam and Power Conversion Systems at HNP. However, piping components in the Potable and Sanitary Water System, Demineralized Water System and the Spent Fuel Cask Decontamination and Spray System are aligned to this item based on material, environment, aging effect, and aging management program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-36	Gray cast iron piping, piping components, and piping elements exposed to soil, treated water, or raw water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801 with exception. The aging effect is managed for susceptible components using the Selective Leaching of Materials Program. The exception involves differences from the NUREG 1801 recommendations for Selective Leaching of Materials Program implementation. In addition, the Potable and Sanitary Water System has been aligned to this item based on material, environment, aging effect, and aging management program.
3.4.1-37	Steel, stainless steel, and nickel-based alloy piping, piping components, and piping elements exposed to steam	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.
3.4.1-38	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The aging effect is managed by the Boric Acid Corrosion Program.
3.4.1-39	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The aging effect is managed by the Water Chemistry Program.

TABLE 3.4.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VIII OF NUREG-1801 FOR STEAM AND POWER CONVERSION SYSTEMS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1-40	Glass piping elements exposed to air, lubricating oil, raw water, and treated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-41	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Note that components from Auxiliary Systems have been aligned to this item number based on component, material, environment, and no aging effect.
3.4.1-42	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-43	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-44	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.4.2-1 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR BLOWDOWN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-25 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-1 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR BLOWDOWN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-25 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.F-26 (S-16)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C

TABLE 3.4.2-1 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR BLOWDOWN SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-23 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.F-24 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-2 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR CHEMICAL ADDITION SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 413
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C

TABLE 3.4.2-3 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.B1-9 (S-15)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
Piping Insulation	M-6	Insulation	Air - Indoor (Outside)	None	None			J, 409

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VIII.I-1 (SP-23)	3.4.1-44	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-2 (SP-32)		F, 410
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	VIII.B1-6 (SP-59)	3.4.1-30	A
			Air/Gas (Dry) (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-6 (SP-25)		G, 410

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.B1-9 (S-15)	3.4.1-29	A
			Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.B1-9 (S-15)	3.4.1-29	A

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C, 406
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-2 (SP-32)		G, 410
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.G-22 (SP-30)		G, 410
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Elastomers	Lubricating Oil or Hydraulic Fluid (Inside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	One-Time Inspection			J
			Air - Indoor (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VIII.H-7 (S-29)		F, 404
		PVC or Thermo-plastics	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VIII.D1-2 (SP-32)		F, 405
			Radiation (Ultraviolet) (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VIII.H-7 (S-29)		F, 405

TABLE 3.4.2-3 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN STEAM SUPPLY SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.D1-3 (SP-38)		G, 410
			Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-4 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM DUMP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VIII.I-1 (SP-23)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Air - Outdoor (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components	VIII.B1-6 (SP-59)	3.4.1-30	A

TABLE 3.4.2-4 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM DUMP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
			Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A

TABLE 3.4.2-4 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM DUMP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H1-8 (A-24)	3.3.1-60	C
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C

TABLE 3.4.2-5 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BOILER/STEAM SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	A
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.B1-9 (S-15)	3.4.1-29	A

TABLE 3.4.2-5 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY BOILER/STEAM SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-11 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.B1-9 (S-15)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A, 418
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
			Air - Outdoor (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VIII.H-8 (A-24)	3.3.1-60	C

TABLE 3.4.2-6 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.D1-9 (S-16)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-6 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Main Feedwater Isolation Valve Accumulators	M-1	Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VIII.I-1 (SP-23)	3.4.1-44	A
			Air - Indoor (Outside)	None	None	VII.J-1 (AP-36)	3.3.1-95	C, 402
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-8 (S-10)	3.4.1-04	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.D1-9 (S-16)	3.4.1-29	A

TABLE 3.4.2-6 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				None	None	VIII.I-13 (SP-1)	3.4.1-42	A, 401
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	None	None	VIII.I-2 (SP-6)	3.4.1-41	A, 402
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C
		Elastomers	Air/Gas (Dry) (Inside)	None	None	VIII.I-15 (SP-4)		J, 411
			Air - Indoor (Outside)	Cracking due to Various Degradation Mechanisms Change in Material Properties due to Various Degradation Mechanisms	External Surfaces Monitoring	VIII.H-7 (S-29)		F, 411

TABLE 3.4.2-6 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Nickel Base Alloys	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-1 (SP-18)	3.4.1-37	C
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)		F
			Air - Indoor (Outside)	None	None	VIII.I-9 (SP-11)	3.4.1-41	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.D1-4 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.D1-5 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-7 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pump Turbine	M-1	Carbon or Low Alloy Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-8 (S-07)	3.4.1-37	C
				Loss of Material due to General Corrosion	Water Chemistry	VIII.B1-8 (S-07)		H
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.B1-10 (S-08)	3.4.1-01	C
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
Auxiliary Feedwater Pump Turbine Lube Oil Cooler Components	M-1	Stainless Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)	3.4.1-19	A, 403
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)		H, 403

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pump Turbine Lube Oil Cooler Components (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A, 403
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A, 403
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C, 403
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A, 403
			Lubricating Oil or Hydraulic Fluid (Outside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)	3.4.1-19	A, 403
				Cracking due to SCC	Lubricating Oil Analysis and One-Time Inspection	VIII.G-3 (S-20)		H, 403
Auxiliary Feedwater Pump Turbine Lube Oil Cooler Tubes	M-5	Stainless Steel	Treated Water (Inside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Water Chemistry and One-Time Inspection	VIII.E-13 (SP-40)	3.4.1-09	C
			Lubricating Oil or Hydraulic Fluid (Outside)	Reduction of Heat Transfer Effectiveness due to Fouling of Heat Transfer Surfaces	Lubricating Oil Analysis and One-Time Inspection	VIII.G-12 (SP-62)	3.4.1-10	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pump Turbine Lube Oil Pump	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-35 (SP-25)	3.4.1-07	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
Auxiliary Feedwater Pump Turbine Lube Oil Tank	M-1	Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-35 (SP-25)	3.4.1-07	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Auxiliary Feedwater Pumps	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.G-37 (S-11)	3.4.1-01	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.G-37 (S-11)	3.4.1-01	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
Flow restricting elements	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flow restricting elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
	M-3	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-32 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.G-33 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VIII.I-1 (SP-23)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Lubricating Oil or Hydraulic Fluid (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Lubricating Oil Analysis and One-Time Inspection	VIII.G-35 (SP-25)	3.4.1-07	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.G-38 (S-10)	3.4.1-04	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.G-37 (S-11)	3.4.1-01	A

TABLE 3.4.2-7 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY FEEDWATER SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
			Concrete (Outside)	None	None	VIII.I-14 (SP-2)	3.4.1-43	A, 415
		Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C
		Glass	Lubricating Oil or Hydraulic Fluid (Inside)	None	None	VIII.I-6 (SP-10)	3.4.1-40	A
			Air - Indoor (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A

TABLE 3.4.2-8 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM CONDENSATE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self- loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Aluminum or Aluminum Alloys	Air/Gas (Dry) (Inside)	None	None	VIII.I-1 (SP-23)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.E1-10 (AP-1)	3.3.1-88	C
		Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
			Air - Indoor (Outside)	Loss of Material due to General Corrosion	External Surfaces Monitoring	VIII.H-7 (S-29)	3.4.1-28	A, 418
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-8 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY STEAM CONDENSATE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C
		Glass	Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A
		Gray Cast Iron	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
				Loss of Material due to Selective Leaching	Selective Leaching of Materials	VIII.E-23 (SP-27)	3.4.1-36	B
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-9 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self- loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
				Loss of Material due to Flow Accelerated Corrosion	Flow-Accelerated Corrosion	VIII.E-35 (S-16)	3.4.1-29	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-9 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.E-30 (SP-17)	3.4.1-14	A
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-10 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE STORAGE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Condensate Storage Tank	M-1	Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-40 (S-13)	3.4.1-06	A
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
		Thermoplastic	Treated Water (Inside)	None	None	VIII.E-40 (S-13)		F, 407
			Air/Gas (Wetted) (Outside)	None	None	VIII.E-40 (S-13)		F, 407

TABLE 3.4.2-10 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – CONDENSATE STORAGE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-34 (S-10)	3.4.1-04	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
		Stainless Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.E-29 (SP-16)	3.4.1-16	A
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-11 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Containment Isolation Piping and Components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-25 (S-10)	3.4.1-04	A, 416
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Heat exchanger shell side components	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Closed-Cycle Cooling Water System	VII.C2-1 (A-63)	3.3.1-48	D
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Treated Water (Inside)	Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VIII.D1-7 (S-11)	3.4.1-01	C
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-25 (S-10)	3.4.1-04	A, 416
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Copper Alloy >15% Zn	Air/Gas (Dry) (Inside)	None	None	VIII.I-3 (SP-5)	3.4.1-44	A
			Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VII.I-12 (AP-66)	3.3.1-88	C
		Glass	Treated Water (Inside)	None	None	VIII.I-8 (SP-35)	3.4.1-40	A
			Air - Indoor (Outside)	None	None	VIII.I-4 (SP-33)	3.4.1-40	A
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.F-23 (SP-16)	3.4.1-16	A, 416
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.F-24 (SP-17)	3.4.1-14	A, 416
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-11 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – SECONDARY SAMPLING SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Thermoplastic	Treated Water (Inside)	None	None	VIII.F-25 (S-10)		F, 408
			Air/Gas (Wetted) (Outside)	None	None	VIII.F-25 (S-10)		F, 408
			Radiation (Ultraviolet) (Outside)	Change in Material Properties due to Various Degradation Mechanisms Cracking due to Various Degradation Mechanisms	External Surfaces Monitoring	VIII.H-10 (S-42)		F, 408

TABLE 3.4.2-12 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR WET LAY UP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure bolting	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Preload due to Thermal Effects, Gasket Creep, and Self-loosening	Bolting Integrity	VIII.H-5 (S-33)	3.4.1-22	B
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	Bolting Integrity	VIII.H-4 (S-34)	3.4.1-22	B
				Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-2 (S-40)	3.4.1-38	A
Piping, piping components, and piping elements	M-1	Carbon or Low Alloy Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-15 (SP-4)	3.4.1-44	A
			Raw Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Microbiologically Influenced Corrosion (MIC) Loss of Material due to Pitting Corrosion	One-Time Inspection	VII.H2-22 (A-38)	3.3.1-76	E, 412
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	One-Time Inspection			J, 414

TABLE 3.4.2-12 (continued) STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – STEAM GENERATOR WET LAY UP SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements (continued)	M-1	Carbon or Low Alloy Steel	Air - Indoor (Outside)	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion	VIII.H-9 (S-30)	3.4.1-38	A
				Loss of Material due to Crevice Corrosion Loss of Material due to General Corrosion Loss of Material due to Pitting Corrosion	External Surfaces Monitoring	VII.H2-3 (AP-41)	3.3.1-59	C, 406
		Stainless Steel	Air/Gas (Dry) (Inside)	None	None	VIII.I-12 (SP-15)	3.4.1-44	A
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion Cracking due to SCC	One-Time Inspection			J, 414
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

TABLE 3.4.2-13 STEAM AND POWER CONVERSION SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE SYSTEM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	M-1	Stainless Steel	Steam (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry	VIII.B1-3 (SP-43)	3.4.1-37	A, 417
				Cracking due to SCC	Water Chemistry	VIII.B1-2 (SP-44)	3.4.1-39	A, 417
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C, 417
			Treated Water (Inside)	Loss of Material due to Crevice Corrosion Loss of Material due to Pitting Corrosion	Water Chemistry and One-Time Inspection	VIII.B1-4 (SP-16)	3.4.1-16	A, 417
				Cracking due to SCC	Water Chemistry and One-Time Inspection	VIII.B1-5 (SP-17)	3.4.1-14	A, 417
				Cracking due to Thermal Fatigue	TLAA, evaluated in accordance with 10 CFR 54.21(c).	VII.E1-16 (A-57)	3.3.1-02	C, 417
			Air - Indoor (Outside)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A

Notes for Tables 3.4.2-1 through 3.4.2-13:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
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:

401. The HNP AMR methodology concluded that external surfaces of carbon steel components at a process temperature above 212°F in the Turbine Building environment have no aging effects.
402. The HNP AMR methodology concluded that the subject material in a Turbine Building environment and the absence of moisture has no aging effects.
403. The Auxiliary Feedwater Pump Turbine Lube Oil Cooler has treated water inside the tubes and lubricating oil inside the shell.
404. The commodity represents hydraulic fluid hoses associated with PORV actuators, and the material is not addressed in NUREG-1801.
405. The commodity represents a breather cap associated with PORV actuators, and the material is not addressed in NUREG-1801.

406. Humidity control is normally not assumed for the Air - Indoor and Air - Outdoor service environments. In these service environments, the HNP AMR methodology for steel (surface temperature < 212°F) always predicts general, crevice, and pitting corrosion. For PWRs, NUREG-1801 manages loss of material on the external surfaces of steel components with XI.M36, External Surfaces Monitoring Program. In some instances, NUREG-1801 lists general, crevice, and pitting corrosion as applicable aging mechanisms (AP-41); and, in other cases, only general corrosion (E-26, E-35, E-44, A-80, A-10, A-105, A-77, and S-29) is listed. The program description in Section XI of NUREG-1801 states: "This program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components within the scope of license renewal and subject to AMR in order to manage aging effects. The program manages aging effects through visual examination of external surfaces for evidence of material loss."

407. The Condensate Storage Tank contains a thermoplastic elastomer diaphragm per the manufacturer, and the material is not addressed in NUREG-1801.

408. The commodity represents tubing associated with sample station flow indicators, and the material is not addressed in NUREG-1801.

409. The commodity represents insulation associated with Main Steam Isolation Valve solenoid valves in the main steam tunnel of the Reactor Auxiliary Building, and the material is not addressed in NUREG-1801.

410. The Main Steam Supply System Power Operated Relief Valve (PORV) actuators contain hydraulic fluid. Main Steam Supply System environments do not include lubricating oil.

411. The commodity represents instrument air hose in the Turbine Building, and the material is not addressed in NUREG-1801.

412. Commodity and environment represent a sample cooler with cooling water supplied with service water. The item represents piping components that are water-filled but no longer in service. The One-Time Inspection AMP is credited because the aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than generally expected.

413. Item represents piping components that are water-filled but no longer in service. The water source is from treated water. An aging effect is not expected to occur, but the data is insufficient to rule it out with reasonable confidence.

414. Item represents piping components that are water-filled but not used on a regular basis. The water source is from treated water. An aging effect is not expected to occur, but the data is insufficient to rule it out with reasonable confidence.

415. This item represents piping embedded in concrete.

416. The source of water for this system is the Steam Generator Blowdown System.

417. The steam and treated water source is the Main Steam Supply System.

418. Although these carbon steel lines are normally above 212°F, plant-specific operating experience has indicated there have been incidences where external corrosion has been found.

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3.5 AGING MANAGEMENT OF CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

3.5.1 INTRODUCTION

Section 3.5 provides the results of the aging management reviews (AMRs) for those components identified in Subsection 2.4, Scoping and Screening Results - Structures, subject to aging management review. The systems or portions of systems are described in the indicated subsections.

1. Containment Building (Subsection 2.4.1)

   Containment Structure (Subsection 2.4.1.1)

   Containment Internal Structures (Subsection 2.4.1.2)

2. Other Class I and In-Scope Structures:

   Reactor Auxiliary Building (Subsection 2.4.2.1)

   Auxiliary Reservoir Channel (Subsection 2.4.2.2)

   Auxiliary Dam and Spillway (Subsection 2.4.2.3)

   Auxiliary Reservoir (Subsection 2.4.2.4)

   Auxiliary Reservoir Separating Dike (Subsection 2.4.2.5)

   Cooling Tower (Subsection 2.4.2.6)

   Cooling Tower Makeup Water Intake Channel (Subsection 2.4.2.7)

   Circulating Water Intake Structure (Subsection 2.4.2.8)

   Diesel Generator Building (Subsection 2.4.2.9)

   Main Dam and Spillway (Subsection 2.4.2.10)

   Diesel Fuel Oil Storage Tank Building (Subsection 2.4.2.11)

   Emergency Service Water and Cooling Tower Makeup Intake Structure (Subsection 2.4.2.12)

   Emergency Service Water Discharge Channel (Subsection 2.4.2.13)

Emergency Service Water Discharge Structure (Subsection 2.4.2.14)

Emergency Service Water Intake Channel (Subsection 2.4.2.15)

Fuel Handling Building (Subsection 2.4.2.16)

HVAC Equipment Room (Subsection 2.4.2.17)

Outside the Power Block Structures (Subsection 2.4.2.18)

Main Reservoir (Subsection 2.4.2.19)

Security Building (Subsection 2.4.2.20)

Emergency Service Water Screening Structure (Subsection 2.4.2.21)

Normal Service Water Intake Structure (Subsection 2.4.2.22)

Switchyard Relay Building (Subsection 2.4.2.23)

Transformer and Switchyard Structures (Subsection 2.4.24)

Turbine Building (Subsection 2.4.2.25)

Tank Area/Building (Subsection 2.4.2.26)

Waste Processing Building (Subsection 2.4.2.27)

Yard Structures (Subsection 2.4.2.28)

Table 3.5.1, Summary of Aging Management Evaluations in Chapter II and III of NUREG-1801 for Containments, Structures, and Component Supports, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component/ commodity groups in this Section. Table 3.5.1 uses the format of Table 1 described in Section 3.0 above.

3.5.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been identified through material/environment evaluations. Plant-specific and industry OE was identified and reviewed in conjunction with the aging management review. The OE review consisted of the following:

Site: HNP site-specific OE has been captured by a review of the Action Tracking and the Maintenance Rule databases and the results of inspections applicable to HNP structures. This effort included an interview with the Structural Systems Engineer, as required. Based on this review, water intrusion into the lower elevations of structures, with concomitant leaching of calcium hydroxide, was identified as an aging effect for HNP.

Industry: Industry OE has been captured in NUREG-1801, "Generic Aging Lessons Learned (GALL)," and is the primary method for verifying that a complete set of potential aging effects is identified. An evaluation of industry OE published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. This was performed using Progress Energy internal OE review process which directs the review of OE and requires that it be screened and evaluated for site applicability. OE sources subject to review include INPO and WANO items, NRC documents (Information Notices, Generic Letters, Notices of Violation, and staff reports), 10 CFR 21 reports, and vendor bulletins, as well as corporate internal OE information from Progress Energy nuclear sites. The industry OE review identified no additional unpredicted or unique aging effects requiring management.

On-Going On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy internal OE review process.

3.5.2 RESULTS

The following tables summarize the results of the aging management review for Containments, Structures and Component Supports.

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Containment Building

Table 3.5.2-2 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Reactor Auxiliary Building

Table 3.5.2-3 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir Channel

Table 3.5.2-4 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Auxiliary Dam and Spillway

Table 3.5.2-5 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir

Table 3.5.2-6 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Auxiliary Reservoir Separating Dike

Table 3.5.2-7 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Cooling Tower

Table 3.5.2-8 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Cooling Tower Makeup Water Intake Channel

Table 3.5.2-9 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Circulating Water Intake Structure

Table 3.5.2-10 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building

Table 3.5.2-11 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Main Dam and Spillway

Table 3.5.2-12 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Diesel Fuel Oil Storage Tank Building

Table 3.5.2-13 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water and Cooling Tower Makeup Intake Structure

Table 3.5.2-14 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Discharge Channel

Table 3.5.2-15 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Discharge Structure

Table 3.5.2-16 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Intake Channel

Table 3.5.2-17 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building

Table 3.5.2-18 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – HVAC Equipment Room

Table 3.5.2-19 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Outside the Power Block Structures

Table 3.5.2-20 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Main Reservoir

Table 3.5.2-21 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Security-Building

Table 3.5.2-22 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Emergency Service Water Screening Structure

Table 3.5.2-23 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Normal Service Water Intake Structure

Table 3.5.2-24 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Switchyard Relay Building

Table 3.5.2-25 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Transformer and Switchyard Structures

Table 3.5.2-26 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Turbine-Building

Table 3.5.2-27 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Tank Area/Building

Table 3.5.2-28 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Waste Processing-Building

Table 3.5.2-29 Containments, Structures and Component Supports – Summary of Aging Management Evaluation – Yard Structures

These tables use the format of Table 2 described in Section 3.0 above.

3.5.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they 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.

3.5.2.1.1 Containment Building

Materials

The materials of construction for the Containment Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel

- Lubrite
- Concrete
- Elastomers
- Insulation (Fiberglass, Hydrous calcium silicate)
- Copper
- Aluminum
- Concrete Block

Environment

The Containment Building components are exposed to the following:
- Containment Air
- Air-Indoor
- Air-Outdoor
- Borated Water Leakage
- Treated Water
- Soil
- Concrete

Aging Effects Requiring Management

The following Containment Building aging effects require management:
- Loss of Material
- Loss of Mechanical Function
- Loss of Leak Tightness in Closed Condition
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Lock-Up

Aging Management Programs

The following AMPs manage the aging effects for the Containment Building components:
- 10 CFR Part 50, Appendix J Program
- ASME Section XI, Subsection IWE Program
- ASME Section XI, Subsection IWL Program
- ASME Section XI, Subsection IWF Program
- Boric Acid Corrosion Program
- Fire Protection Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Structures Monitoring Program
- Water Chemistry Program

- Masonry Wall Program

3.5.2.1.2 Reactor Auxiliary Building

Materials

The materials of construction for the Reactor Auxiliary Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Concrete Block
- Fire Proofing Materials
- Elastomers
- Lubrite
- Incombustible Mineral Fiber
- Aluminum

Environment

The Reactor Auxiliary Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Soil
- Borated Water Leakage
- Concrete

Aging Effects Requiring Management

The following Reactor Auxiliary Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Reactor Auxiliary Building components:

- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program

- Fire Protection Program
- Boric Acid Corrosion Program
- Masonry Wall Program

3.5.2.1.3 Auxiliary Reservoir Channel

Materials

The materials of construction for the Auxiliary Reservoir Channel components are:

- Earth

Environment

The Auxiliary Reservoir Channel components are exposed to the following:

- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Auxiliary Reservoir Channel aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Auxiliary Reservoir Channel components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.4 Auxiliary Dam and Spillway

Materials

The materials of construction for the Auxiliary Dam and Spillway components are:

- Earth
- Reinforced Concrete

Environment

The Auxiliary Dam and Spillway components are exposed to the following:

- Air-Outdoor

- Raw Water
- Soil

Aging Effects Requiring Management

The following Auxiliary Dam and Spillway aging effects require management:

- Loss of Material
- Loss of Form
- Cracking
- Change in Material Properties

Aging Management Programs

The following AMP manages the aging effects for the Auxiliary Dam and Spillway components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.5 Auxiliary Reservoir

Materials

The materials of construction for the Auxiliary Reservoir components are:

- Earth

Environment

The Auxiliary Reservoir components are exposed to the following:

- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Auxiliary Reservoir aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Auxiliary Reservoir components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.6 Auxiliary Reservoir Separating Dike

Materials

The materials of construction for the Auxiliary Reservoir Separating Dike components are:
- Earth

Environment

The Auxiliary Reservoir Separating Dike components are exposed to the following:
- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Auxiliary Reservoir Separating Dike aging effects require management:
- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Auxiliary Reservoir Separating Dike components:
- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.7 Cooling Tower

Materials

The materials of construction for the Cooling Tower components are:
- Asbestos Cement
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Stainless Steel

Environment

The Cooling Tower components are exposed to the following:

- Air-Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Cooling Tower aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Cooling Tower components:

- Structures Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program
- External Surfaces Monitoring Program

3.5.2.1.8 Cooling Tower Makeup Water Intake Channel

Materials

The materials of construction for the Cooling Tower Makeup Water Intake Channel components are:

- Earth

Environment

The Cooling Tower Makeup Water Intake Channel components are exposed to the following:

- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Cooling Tower Makeup Water Intake Channel aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Cooling Tower Makeup Water Intake Channel components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.9 Circulating Water Intake Structure

Materials

The materials of construction for the Circulating Water Intake Structure components are:

- Reinforced Concrete

Environment

The Circulating Water Intake Structure components are exposed to the following:

- Air-Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Circulating Water Intake Structure aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties

Aging Management Programs

The following AMP manages the aging effects for the Circulating Water Intake Structure components:

- Structures Monitoring Program

3.5.2.1.10 Diesel Generator Building

Materials

The materials of construction for the Diesel Generator Building components are:

- Carbon Steel
- Galvanized Carbon Steel

- Stainless Steel
- Aluminum
- Reinforced Concrete
- Concrete Block
- Elastomers

Environment

The Diesel Generator Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Soil
- Concrete

Aging Effects Requiring Management

The following Diesel Generator Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Generator Building components:

- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program
- Fire Protection Program
- Masonry Wall Program

3.5.2.1.11 Main Dam and Spillway

Materials

The materials of construction for the Main Dam and Spillway components are:

- Earth
- Carbon Steel
- Reinforced Concrete

Environment

The Main Dam and Spillway components are exposed to the following:
- Air-Outdoor
- Raw Water
- Soil
- Concrete

Aging Effects Requiring Management

The following Main Dam and Spillway aging effects require management:
- Loss of Material
- Loss of Form
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Main Dam and Spillway components:
- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.12 Diesel Fuel Oil Storage Tank Building

Materials

The materials of construction for the Diesel Fuel Oil Storage Tank Building components are:
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Elastomers
- Fire Proofing Materials

Environment

The Diesel Fuel Oil Storage Tank Building components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Soil
- Concrete

Aging Effects Requiring Management

The following Diesel Fuel Oil Storage Tank Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Diesel Fuel Oil Storage Tank Building components:

- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program
- Fire Protection Program

3.5.2.1.13 Emergency Service Water and Cooling Tower Makeup Intake Structure

Materials

The materials of construction for the Emergency Service Water and Cooling Tower Makeup Intake Structure components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Elastomers

Environment

The Emergency Service Water and Cooling Tower Makeup Intake Structure components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Raw Water
- Soil
- Concrete

Aging Effects Requiring Management

The following Emergency Service Water and Cooling Tower Makeup Intake Structure aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Service Water and Cooling Tower Makeup Intake Structure components:

- Structures Monitoring Program
- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program
- ASME Section XI, Subsection IWF Program
- Fire Protection Program

3.5.2.1.14 Emergency Service Water Discharge Channel

Materials

The materials of construction for the Emergency Service Water Discharge Channel components are:

- Earth

Environment

The Emergency Service Water Discharge Channel components are exposed to the following:

- Air-Outdoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following Emergency Service Water Discharge Channel aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Emergency Service Water Discharge Channel components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.15 Emergency Service Water Discharge Structure

Materials

The materials of construction for the Emergency Service Water Discharge Structure components are:

- Reinforced Concrete

Environment

The Emergency Service Water Discharge Structure components are exposed to the following:

- Air-Outdoor
- Raw Water
- Soil

Aging Effects Requiring Management

The following Emergency Service Water Discharge Structure aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Service Water Discharge Structure components:

- Structures Monitoring Program
- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.16 Emergency Service Water Intake Channel

Materials

The materials of construction for the Emergency Service Water Intake Channel components are:

- Earth

Environment

The Emergency Service Water Intake Channel components are exposed to the following:

- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Emergency Service Water Intake Channel aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Emergency Service Water Intake Channel components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.17 Fuel Handling Building

Materials

The materials of construction for the Fuel Handling Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Concrete Block
- Boraflex
- Boral
- Fire Proofing Materials
- Elastomers

Environment

The Fuel Handling Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Soil
- Treated Water
- Concrete

Aging Effects Requiring Management

The following Fuel Handling Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation
- Reduction of Neutron Absorbing Capacity

Aging Management Programs

The following AMPs manage the aging effects for the Fuel Handling Building components:

- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program
- Water Chemistry Program
- Boraflex Monitoring Program
- Fire Protection Program
- Inspection of Overhead Heavy Load and Light Load Handling Systems Program
- Masonry Wall Program

3.5.2.1.18 HVAC Equipment Room

Materials

The materials of construction for the HVAC Equipment Room components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Concrete Block

- Elastomers

Environment

The HVAC Equipment Room components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Concrete

Aging Effects Requiring Management

The following HVAC Equipment Room aging effects require management:
- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the HVAC Equipment Room components:
- Structures Monitoring Program
- Masonry Wall Program

3.5.2.1.19 Outside the Power Block Structures

Materials

The materials of construction for the Outside the Power Block Structures components are:
- Carbon Steel
- Reinforced Concrete

Environment

The Outside the Power Block Structures components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Soil
- Concrete

Aging Effects Requiring Management

The following Outside the Power Block Structures aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Outside the Power Block Structures components:

- Structures Monitoring Program
- One-Time Inspection Program

3.5.2.1.20 Main Reservoir

Materials

The materials of construction for the Main Reservoir components are:

- Earth

Environment

The Main Reservoir components are exposed to the following:

- Air-Outdoor
- Raw Water

Aging Effects Requiring Management

The following Main Reservoir aging effects require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following AMP manages the aging effects for the Main Reservoir components:

- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program

3.5.2.1.21 Security Building

Materials

The materials of construction for the Security Building components are:
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Concrete Block

Environment

The Security Building components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Soil
- Concrete

Aging Effects Requiring Management

The following Security Building aging effects require management:
- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Security Building components:
- Structures Monitoring Program
- Masonry Wall Program

3.5.2.1.22 Emergency Service Water Screening Structure

Materials

The materials of construction for the Emergency Service Water Screening Structure components are:
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Elastomers
- Stainless Steel

Environment

The Emergency Service Water Screening Structure components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Emergency Service Water Screening Structure aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Emergency Service Water Screening Structure components:

- Structures Monitoring Program
- RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program
- ASME Section XI, Subsection IWF Program
- Fire Protection Program

3.5.2.1.23 Normal Service Water Intake Structure

Materials

The materials of construction for the Normal Service Water Intake Structure components are:

- Carbon Steel
- Reinforced Concrete

Environment

The Normal Service Water Intake Structure components are exposed to the following:

- Air-Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Normal Service Water Intake Structure aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Normal Service Water Intake Structure components:

- Structures Monitoring Program

3.5.2.1.24 <u>Switchyard Relay Building</u>

Materials

The materials of construction for the Switchyard Relay Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Elastomers

Environment

The Switchyard Relay Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Soil

Aging Effects Requiring Management

The following Switchyard Relay Building aging effects require management:
- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Switchyard Relay Building components:
- Structures Monitoring Program

3.5.2.1.25 Transformer and Switchyard Structures

Materials

The materials of construction for the Transformer and Switchyard Structures components are:
- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- PVC
- Wood
- Aluminum
- Stainless Steel

Environment

The Transformer and Switchyard Structures components are exposed to the following:
- Air-Indoor
- Air-Outdoor
- Concrete
- Soil

Aging Effects Requiring Management

The following Transformer and Switchyard Structures aging effects require management:
- Loss of Material
- Cracking
- Change in Material Properties

- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMPs manage the aging effects for the Transformer and Switchyard Structures components:

- Structures Monitoring Program
- Fire Protection Program

3.5.2.1.26 Turbine Building

Materials

The materials of construction for the Turbine Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Concrete Block
- Elastomers

Environment

The Turbine Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Soil

Aging Effects Requiring Management

The following Turbine Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Turbine Building components:

- Structures Monitoring Program

- ASME Section XI, Subsection IWF Program
- Masonry Wall Program
- Fire Protection Program

3.5.2.1.27 Tank Area/Building

Materials

The materials of construction for the Tank Area/Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Reinforced Concrete
- Concrete Block
- Elastomers

Environment

The Tank Area/Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Soil

Aging Effects Requiring Management

The following Tank Area/Building aging effects require management:

- Loss of Material
- Loss of Mechanical Function
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Tank Area/Building components:

- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program
- Masonry Wall Program
- Fire Protection Program

3.5.2.1.28 Waste Processing Building

Materials

The materials of construction for the Waste Processing Building components are:

- Carbon Steel
- Galvanized Carbon Steel
- Stainless Steel
- Reinforced Concrete
- Concrete Block
- Elastomers

Environment

The Waste Processing Building components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Soil

Aging Effects Requiring Management

The following Waste Processing Building aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation
- Delamination/Separation

Aging Management Programs

The following AMPs manage the aging effects for the Waste Processing Building components:

- Structures Monitoring Program
- Masonry Wall Program
- Fire Protection Program

3.5.2.1.29 Yard Structures

Materials

The materials of construction for the Yard Structures components are:

- Carbon Steel
- Galvanized Carbon Steel

- Stainless Steel
- Reinforced Concrete
- Elastomers
- PVC (including PVC-coated steel)

Environment

The Yard Structures components are exposed to the following:

- Air-Indoor
- Air-Outdoor
- Concrete
- Raw Water
- Soil

Aging Effects Requiring Management

The following Yard Structures aging effects require management:

- Loss of Material
- Cracking
- Change in Material Properties
- Reduction In Concrete Anchor Capacity due to Local Concrete Degradation

Aging Management Programs

The following AMP manages the aging effects for the Yard Structures components:

- Buried Piping and Tanks Inspection Program
- Structures Monitoring Program
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

3.5.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 identifies those aging management activities that warrant further evaluation. For the Containments, Structures, and Component Supports, these activities are addressed in the following subsections.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

For the Containment Structure, the ASME Section XI, Subsection IWL Program is used to manage aging of accessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel.

The HNP site groundwater is non-aggressive based on samples taken in August 2005 from two wells (Well 57 – pH 7.6, chlorides 290 mg/l, sulfate 2.4 mg/l, phosphate < 500 µg/l; Well 59 - pH 7.9, chlorides 42 mg/l, sulfate 2.1 mg/l, phosphate < 500 µg/l) and no trends in increasing aggressiveness are noted when compared to groundwater samples taken in 1973. In addition, there are no external, air environments which have the potential to concentrate contaminants via leakage or weather and present an aggressive environment. HNP is not near enough to any industrial facility or salt water environment such that rain or leakage would have the potential to concentrate contaminants and provide an aggressive environment.

With respect to monitoring inaccessible areas, the below grade portions of Containment Building concrete are not surrounded by backfill. The below grade concrete for the Containment Building is completely surrounded by other Class I structures. Below-grade Containment Building concrete cannot be examined unless the concrete of surrounding Class I structures is removed. However, examination of exposed representative portions of below grade concrete in the same groundwater environment for the surrounding Class I structures is performed when uncovered during removal of backfill. This is considered equivalent to examining the Containment concrete.

In addition, the Structures Monitoring Program is used to ensure that groundwater is monitored on a periodic basis including consideration of potential seasonal variations.

3.5.2.2.1.2 Cracks and Distortion Due to Increased Stress Levels from Settlement; Reduction of Foundation Strength, Cracking and Differential Settlement Due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program

For the Containment Structure, aging effects due to settlement are managed by the Structures Monitoring Program and a de-watering system is not relied upon for control of settlement.

The Containment Structure was founded on unrippable rock and settlement was essentially zero during construction. This is documented in NRC Inspection Report 50-400/97-07 dated August 27, 1997. No cracking due to settlement is expected; however the Structures Monitoring Program examines concrete for cracking and is credited for managing the aging effect of cracking.

The NUREG-1801 item regarding erosion of porous concrete subfoundations is not applicable to the Containment Structure. The HNP Containment Structure does not have a porous concrete subfoundation. HNP does have a system of porous concrete drainage channels located within the working slab under the containment basemat. The porous concrete layer was placed in a spoke-like pattern with 6 in. wide and 4 in. high spokes. Therefore, the basemat is not entirely resting on the porous concrete. Based on the design and construction of the porous concrete material within the basemat, the water sample results, and site structural walkdown results, the HNP porous concrete does not exhibit signs of degradation as detailed in NRC Information Notice 97-11. A dewatering system is utilized to remove groundwater leakage through the waterproofing membrane under the containment building basemat. However, a dewatering system is not relied upon to control erosion of cement from porous concrete or to manage settlement.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature

The NUREG-1801 item regarding concrete degradation from elevated temperatures is not applicable, because no Containment concrete structural components exceed the specified temperature limits. The containment is maintained below a bulk average temperature of 120°F by the Containment Cooling System. The area between the primary shield wall and the reactor vessel is maintained at a temperature below 150°F by the Primary Shield and Reactor Supports Cooling System. The concrete in the cylinder wall where hot pipe penetrations (pipe temperature > 200°F) pass through is maintained below 200°F by insulation on the hot pipe, or for the feedwater and main steam penetrations, a combination of insulation on the hot pipe and a copper fin cooling system. The fin cooling assemblies provide a passive heat transfer system whose purpose is to remove excess heat from the penetration flued heads.

3.5.2.2.1.4 Loss of Material Due to General, Pitting and Crevice Corrosion

The aging effect for the containment liner, liner anchors, and integral attachments is managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J Programs.

Loss of material due to corrosion is not significant for inaccessible areas (embedded containment steel liner) based on meeting the conditions specified as follows:

1. Concrete meeting ACI 318 and ACI 349 was used in contact with the embedded steel liner. ACI 201.2R was not used as guidance for concrete mix proportions, but ACI 211.1-74 was used. ACI 211.1-74 provides guidance for producing high-density, low permeability concrete mix designs similar to ACI 201.2R.
2. The Containment liner is monitored for corrosion or degraded protective coatings by the ASME Section XI, Subsection IWE Program.
3. The moisture barrier is monitored for aging effects by the ASME Section XI, Subsection IWE Program.

4. Borated water spills and water ponding on the Containment Building 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.

3.5.2.2.1.5 Loss of Prestress Due to Relaxation, Shrinkage, Creep, and Elevated Temperature

The HNP Containment Building Structure is constructed of reinforced concrete. There are no prestressed tendons associated with the Containment Building Structure design. Therefore, the aging effect, loss of prestress, is not applicable to the HNP Containment Structure.

3.5.2.2.1.6 Cumulative Fatigue Damage

Fatigue is a TLAA for the bellows expansion joints associated with the two Containment Spray and two Safety Injection System recirculation valve chambers and for the expansion bellows associated with the fuel transfer tube in the Fuel Handling Building. The evaluation of this TLAA is provided in Section 4.6. Other containment mechanical penetration bellows are located outside the Containment Building and have been screened out of scope of License Renewal because they do not perform a Containment Building pressure boundary intended function.

A fatigue analysis does not exist for the penetration sleeves and dissimilar metal welds, such as those between penetration flued heads to the penetration sleeves. Also, the NUREG-1801 BWR components, i.e., suppression pool shell and unbraced downcomers, are not applicable to the HNP containment.

3.5.2.2.1.7 Cracking Due to Stress Corrosion Cracking (SCC)

Cracking due to SCC is not applicable for these components, because: (1) carbon steel components are not susceptible to SCC, and (2) to be susceptible to SCC, stainless steel must be subjected to both high temperature (>140°F) and an aggressive chemical environment. Cracking due to SCC is not an applicable effect for the stainless steel penetration sleeves and bellows because these stainless steel components are not subject to an aggressive chemical environment.

3.5.2.2.1.8 Cracking Due to Cyclic Loading

Cracking due to cyclic loading is managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J Programs for containment penetration sleeves and the two Containment Spray and two Safety Injection System recirculation valve chamber bellows expansion joints. The remaining mechanical penetration bellows are screened out of scope of License Renewal because they do not perform a Containment structure pressure boundary intended function. No operating experience has been found for the aging effect of fine cracking of these components, and HNP does not expect fine cracking of the penetrations and bellows to occur. The aging effect of fine cracking is a result of cyclic loading or fatigue. TLAA evaluations for fatigue of bellows expansion joints and the piping that attachés to the penetration sleeves have been performed; and the projected number of fatigue cycles for 60 years of operation is less than the design number for 40 years of operation. Use of the ASME Section XI, Subsection IWE Program together with the 10 CFR Part 50 Appendix J Program is adequate for monitoring the aging effects for penetrations and bellows due to cyclic loading.

3.5.2.2.1.9 Loss of Material (Scaling, Cracking, and Spalling) Due to Freeze-Thaw

The plant is located within a moderate weathering zone. Loss of material due to freeze-thaw is managed by the ASME Section XI, Subsection IWL Program for the portion of the Containment cylinder wall and dome which is exposed to an outdoor environment. The only part of the Containment Building subject to freeze-thaw is the accessible cylinder wall and dome which extend above the Reactor Auxiliary Building and the Fuel Handling Building. Examinations of accessible concrete per the ASME Section XI, Subsection IWL Program have not identified loss of material and cracking due to freeze thaw as an aging effect. Inaccessible concrete areas of the Containment Building are surrounded by an indoor environment and are not subject to moderate weathering conditions resulting in freeze-thaw.

3.5.2.2.1.10 Cracking Due to Expansion and Reaction with Aggregate, and Increase in Porosity and Permeability, Due to Leaching of Calcium Hydroxide

The ASME Section XI, Subsection IWL Program is used to manage aging effects for accessible Containment Structure concrete. For inaccessible areas, concrete was constructed to ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete mix designs similar to ACI 201.2R. Therefore, a potential increase in porosity and permeability due to leaching of calcium hydroxide is not an aging effect requiring management.

Regarding cracking due to reaction with aggregates, concrete aggregates were selected per ASTM C33, which uses ASTM C227 and ASTM C295. The aggregates used are non-reactive.

3.5.2.2.2 <u>Safety Related and Other Structures and Component Supports</u>

3.5.2.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program

The following aging mechanisms are not applicable to Containment Internal Structures concrete which includes the Refueling Canal concrete, because of its location. However, the Structures Monitoring Program is used to inspect the accessible portions.

1. Freeze-Thaw,
2. Aging effects due to increased stress levels from settlement,

3. Erosion of porous concrete subfoundation,
4. Aggressive chemical attack (for below-grade concrete)
5. Corrosion of embedded steel (for below-grade concrete), and
6. Leaching of calcium hydroxide (for concrete foundations).

The Containment Internal Structures are located in and supported by the Containment Building; the internals are not supported on soil or on a porous concrete subfoundation, nor are they exposed to outdoor environments. Aging effects due to settlement are managed by the Structures Monitoring Program for the Containment Building. Refer to Table 3.5.1 Line Items 3.5.1-02 and 3.5.1-03 for further evaluation.

For structures outside the Containment Building, aging effects due to settlement are managed by the Structures Monitoring Program or, in the case of the Auxiliary Dam and Spillway and the Main Dam and Spillway, the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program, and a de-watering system is not relied upon for control of settlement. None of the HNP structures in the scope of License Renewal have porous subfoundations.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

1. <u>Freeze-Thaw</u>

The Structures Monitoring program is used to manage loss of material and cracking of concrete for the Containment Internal Structures, which include the Refueling Canal. HNP is located within a moderate weathering zone; however, the Containment Internal concrete, both accessible and inaccessible, is inside the Containment Building and not exposed to an outdoor environment; therefore, it is not subject to freeze-thaw.

For other structures outside the containment in scope of License Renewal and subject to freeze-thaw, the concrete design varied depending on the safety classification of the structure. Safety related structures were designed with Class 1 concrete; others, with Non-Class 1 concrete. HNP is located in a moderate weathering zone.

HNP Class 1 concrete was constructed to ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete similar to ACI 201.2R for concrete mix designs. Non-Class 1 concrete was not required per plant specifications to meet water/cement ratios of ACI 201.2R-77. However, Non-Class 1 concrete was designed to the requirements of ACI 318-71, ACI 301-72, and plant specifications. Subsequent inspections have not indicated any degradation due to freeze-thaw for either Class 1 or Non-Class 1 concrete. Nevertheless, examination of inaccessible Non-Class 1 concrete used for the structures in scope for License Renewal will be performed when excavated for any reason.

Structures that were constructed, in whole or in part, using Non-Class 1 concrete are the Auxiliary Dam and Spillway, Cooling Tower, CW Intake Structure, Main Dam and Spillway, Outside the Power Block Structures, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, and Yard Structures. The Auxiliary Dam and Spillway and Main Dam and Spillway are Group 6 structures.

2. Reaction with Aggregates

For the Containment Internal Structures including the Refueling Canal, and the Reactor Auxiliary, Diesel Generator, and Diesel Fuel Oil Storage Tank Buildings, the Fuel Handling Building, the HVAC Equipment Room (located on the roof of the Reactor Auxiliary Building), the Tank Area/Building, the Waste Processing Building, and portions of the Turbine Building and Yard structures that use Class 1 concrete, the concrete in inaccessible areas was constructed to ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete similar to ACI 201.2R for concrete mix designs. These structures are not susceptible to concrete cracking due to expansion due to reaction with aggregates; the concrete aggregates were selected per ASTM C33, which uses ASTM C227 and ASTM C295. The aggregates used are not reactive.

Non-Class 1 concrete was not required per plant specifications to meet water/cement ratios of ACI 201.2R-77. However, Non-Class 1 concrete used the same non-reactive aggregates as Class 1 concrete and was designed to the requirements of ACI 318-71, ACI 301-72, and plant specifications. Subsequent inspections have not indicated any degradation due to reaction with aggregates. Nevertheless, examination of inaccessible Non-Class 1 concrete used in the construction of the structures in scope for License Renewal will be performed when excavated for any reason. Structures subject to examination are the Non-Class 1 concrete of the Cooling Tower, CW Intake Structure, NSW Intake Structure, Outside the Power Block Structures, Security Building, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, and Yard Structures. Refer to Subsection 3.5.2.2.2.2.1 above for a list of structures that use Non-Class 1 concrete.

3. Increased Stress Levels from Settlement and Erosion of Porous Concrete

The Refueling Canal concrete (which is a NUREG-1801, Group 5 structure and included with the Containment Internals concrete) is supported within the Containment Building and is not supported on a porous concrete subfoundation and does not rely on a dewatering system. Structures outside the Containment Building also do not rely on a de-watering system for control of settlement. None of the HNP structures in the scope of License Renewal have porous subfoundations.

With respect to settlement, the HNP structures in the scope of License Renewal were founded on sound and unrippable rock except for the Cooling Tower, CW Intake Structure, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, and some Yard structures, which are supported on sound rock, engineered fill, or undisturbed soil. The Outside the Power Block

Structure Fuel Handling Building Retaining Wall is supported on modified random fill. Since construction, the Retaining Wall was required to be monitored and evaluated until settlement and lateral movement had stabilized. Currently, monitoring and evaluation of the Retaining Wall is performed by Engineering Periodic Test. To date, no adverse plant specific operating experience has been recorded. The Retaining Wall does not have a porous concrete subfoundation.

Settlement for safety related structures was essentially zero during construction. This is documented in NRC Inspection Report 50-400/97-07 dated August 27, 1997. No cracking due to settlement is expected; however, the Structures Monitoring Program or, in the case of the Auxiliary Dam and Spillway and the Main Dam and Spillway, the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program, examine concrete for cracking and are credited for managing the aging effect of cracking. Likewise, no cracking due to settlement is expected for structures in the scope of License Renewal that are not founded on sound rock. For these structures also, the Structures Monitoring Program examines concrete for cracking and is credited for managing the aging effect of cracking.

4. Aggressive Chemical Attack and Corrosion of Embedded Steel

The Containment Refueling Canal concrete is not in a soil environment but is supported within the Containment Building; therefore, these aging effects/mechanisms are not applicable. HNP site groundwater parameters are provided in Subsection 3.5.2.2.1.1. The groundwater chemistry is non-aggressive.

5. Leaching of Calcium Hydroxide

The Containment Refueling Canal concrete is inside the Containment in the Containment Air environment and does not have an exterior above or below grade foundation; therefore, these aging effects/mechanism are not applicable. For inaccessible areas in structures outside the Containment Building, safety related, Class 1 concrete was constructed to ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete similar to ACI 201.2R for concrete mix designs. Therefore, no aging management program is required for inaccessible areas in safety related structures outside the Containment Building.

Non-Class 1 concrete was not required per HNP specifications to meet water/cement ratios of ACI 201.2R-77. However, Non-Class 1 concrete was designed to the requirements of ACI 318-71, ACI 301-72, and plant specifications. Subsequent inspections have not indicated any degradation due to leaching of calcium hydroxide. Because the recommendations of ACI 201.2R-77 were not specified, inaccessible Non-Class 1 concrete used in the construction of structures in scope of License Renewal will be examined whenever excavated for any reason in accordance with the Structures Monitoring Program. Refer to Subsection 3.5.2.2.2.2.1 above for a list of structures that use Non-Class 1 concrete.

3.5.2.2.2.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature

The NUREG-1801 item regarding concrete degradation from elevated temperatures is not applicable, because neither the Containment Internal concrete nor the concrete structural components for other structures outside containment exceed the specified temperature limits. The containment is maintained below a bulk average temperature of 120°F with the Containment Cooling System; and the area between the primary shield wall and the reactor vessel is maintained at a temperature below 150°F with the Primary Shield and Reactor Supports Cooling System. The maximum temperature for the Reactor Auxiliary, Diesel Generator, and Waste Processing Buildings during normal plant operation is 122°F. The maximum temperature for the Fuel Handling Building during normal plant operation is 104°F. The maximum temperature for the Cooling Tower, CW Intake Structure, Outside the Power Block Structures, the Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, and Yard structures, during normal plant operation is 105°F. The Turbine Building maximum temperature during normal operations is 120°F. The maximum temperature for the HVAC Equipment Room during normal plant operation is 75°F.

3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures

1. Aggressive Chemical Attack and Corrosion of Embedded Steel

HNP site groundwater parameters are provided in Subsection 3.5.2.2.1.1. The groundwater chemistry is non-aggressive. In addition, Main and Auxiliary Reservoir water is non-aggressive based on a review of reservoir chemistry.

2. Freeze-Thaw

The plant is located within a moderate weathering zone. The only normally inaccessible (i.e., below water level) portions of the water control structures potentially exposed to freeze-thaw are the concrete members subject to wave action and a few inches below the water surface. However, based upon field observations, ice has not been observed at Class 1 Water Control Structures other than in isolated coves. Only outside areas are monitored by the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program. Although no aging effect is expected, examinations performed per the RG 1.127 Program are adequate to detect cracking and loss of material due to freeze-thaw.

3. Reaction with Aggregates and Leaching of Calcium Hydroxide

For inaccessible areas, HNP concrete aggregates were selected per ASTM C33, which uses ASTM C227 and ASTM C295. Non-Class 1 concrete used the same non-reactive aggregates as Class 1 concrete. Also, inaccessible reinforced Class 1 concrete was constructed to ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete similar to ACI 201.2R for concrete mix designs. Non-Class 1 concrete was used in the Auxiliary Dam and Spillway and Main Dam and Spillway. Non-Class 1 concrete was not required per plant specifications to meet water/cement ratios of ACI 201.2R-77. Therefore, examination of inaccessible Non-Class 1 concrete used at the Auxiliary Dam and Spillway and Main Dam and Spillway will be performed when excavated for any reason as discussed in the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program.

3.5.2.2.2.5 Cracking Due to Stress Corrosion Cracking and Loss of Material Due to Pitting and Crevice Corrosion

Cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion of stainless steel tank liners is not applicable to HNP. HNP does not have tanks with stainless steel liners. Aging management of tanks and the carbon steel liners of the Diesel Generator Fuel Oil Storage Tanks is addressed with the mechanical system in which the tanks are located.

3.5.2.2.2.6 Aging of Supports Not Covered by Structures Monitoring Program

NUREG-1801 recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program including (1) loss of material due to general and pitting corrosion for Groups B2-B5 supports; (2) reduction in concrete anchor capacity due to degradation of the surrounding concrete for Groups B1-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports.

Unless the aging effect is not applicable, the Structures Monitoring Program is used to manage degradation of supports for HNP structures within the scope of License Renewal, except for the Main Dam and Spillway, which uses the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program instead of the Structures Monitoring Program. The RG 1.127 Program performs a visual inspection of the concrete surfaces for deterioration and continuing serviceability of the concrete. This includes an examination for structural cracking resulting from overstress due to applied loads, shrinkage, and temperature affects, or lateral movement. Both the RG 1.127 Program and the Structures Monitoring program utilize ACI 349.3R-96 for concrete acceptance criteria. Therefore, use of the RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program is equivalent to use of the Structures Monitoring Program.

Vibration isolation elements, in accordance with NUREG-1801, Volume 2, related item T-31, were not utilized in any HNP structure within the scope of License Renewal; therefore, application of the Structures Monitoring Program is not required.

3.5.2.2.2.7 Cumulative Fatigue Damage Due to Cyclic Loading

Fatigue of component support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports is a TLAA as defined in 10 CFR 54.3 only if a CLB fatigue analysis exists.

There are no fatigue analyses in the CLB applicable to component supports; therefore, cumulative fatigue damage of component supports is not a TLAA as defined in 10 CFR 54.3.

3.5.2.2.3 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.5.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Containments, Structures, and Component Support components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Penetration bellows expansion joint fatigue (Section 4.6, Containment Liner Plate, Metal Containments, and Penetration Fatigue Analysis)
2. Crane cyclic load analyses (Section 4.7, Other TLAAs)
3. Reservoir sedimentation analysis (Section 4.7, Other TLAAs)

3.5.3 CONCLUSIONS

The Containments, Structures, and Component Support components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Containments, Structures, and Component Support components/ commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.5.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	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					
3.5.1-01	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment (as applicable).	Aging of accessible and inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	ISI (IWL) and for inaccessible concrete, an examination of representative samples of below-grade concrete and periodic monitoring of groundwater if environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes, plant-specific, if the environment is aggressive	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. The environment is non-aggressive; no further evaluation is required. Refer to Subsection 3.5.2.2.1.1 for additional information regarding groundwater parameters and examinations of representative samples of below grade concrete for the Containment Structure.
3.5.1-02	Concrete elements; All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Consistent with NUREG-1801. Aging effects are managed by the Structures Monitoring Program and a de-watering system is not relied upon for control of settlement. Therefore, further evaluation is not required. Additional information regarding settlement is provided in Subsection 3.5.2.2.1.2.
3.5.1-03	Concrete elements: foundation, sub-foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program. If a de-watering system is relied upon to control erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Erosion of porous concrete subfoundations is not applicable to the Containment Structure. Refer to the evaluation in Subsection 3.5.2.2.1.2.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-04	Concrete elements: dome, wall, basemat, ring girder, buttresses, containment, concrete fill-in annulus (as applicable)	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, plant-specific if temperature limits are exceeded	Reduction of strength and modulus due to elevated temperature is not applicable to the Containment Structure. Refer to the evaluation in Subsection 3.5.2.2.1.3.
3.5.1-05	BWR Only				
3.5.1-06	Steel elements: steel liner, liner anchors, integral attachments	Loss of material due to general, pitting and crevice corrosion	ISI (IWE) and 10 CFR Part 50, Appendix J	Yes, if corrosion is significant for inaccessible areas	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. Loss of material due to corrosion is not significant for inaccessible areas (embedded containment steel liner) Refer to the evaluation in Subsection 3.5.2.2.1.4.
3.5.1-07	Prestressed containment tendons	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This item applies to prestressed concrete containments. It is not applicable to the HNP steel-lined reinforced concrete containment.
3.5.1-08	BWR Only				
3.5.1-09	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. Refer to the evaluation in Subsection 3.5.2.2.1.6.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-10	Stainless steel penetration sleeves, penetration bellows, dissimilar metal welds	Cracking due to stress corrosion cracking	ISI (IWE) and 10 CFR Part 50, Appendix J and additional appropriate examinations/evaluations for bellows assemblies and dissimilar metal welds	Yes, detection of aging effects is to be evaluated	Cracking due to SCC is not applicable to these stainless steel components. Refer to the discussion in Subsection 3.5.2.2.1.7.
3.5.1-11	BWR Only				
3.5.1-12	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cracking due to cyclic loading	ISI (IWE) and 10 CFR Part 50, Appendix J supplemented to detect fine cracks	Yes, detection of aging effects is to be evaluated	The aging effect of cracking for the penetration sleeves and penetration bellows is managed by the ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs. However, HNP does not supplement the programs to detect fine cracks; and HNP uses an alternative Code Edition and Addenda. Refer to the evaluation in Subsection 3.5.2.2.1.8.
3.5.1-13	BWR Only				
3.5.1-14	Concrete elements: dome, wall, basemat ring girder, buttresses, containment (as applicable)	Loss of material (Scaling, cracking, and spalling) due to freeze-thaw	ISI (IWL) Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. Refer to the discussion of the HNP Containment Building design in Subsection 3.5.2.2.1.9.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-15	Concrete elements: walls, dome, basemat, ring girder, buttresses, contain-ment, concrete fill-in annulus (as applicable).	Increase in porosity, permeability due to leaching of calcium hydroxide; cracking due to expansion and reaction with aggregate	ISI (IWL) for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. Concrete was constructed using ACI 211.1-74, which provides guidance for producing high-density, low permeability concrete mix designs similar to ACI 201.2R. Further evaluation in accordance with NUREG-1801 is not required. Additional information is provided in Subsection 3.5.2.2.1.10.
3.5.1-16	Seals, gaskets, and moisture barriers	Loss of sealing and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	ISI (IWE) and 10 CFR Part 50, Appendix J	No	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. The ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs are used to manage loss of sealant and leakage through contain-ment due to deterioration of seals and gaskets. The ASME Section XI, Subsection IWE Program is used to manage loss of seal and leakage of the moisture barrier at the containment liner to concrete floor slab interface.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-17	Personnel airlock, equipment hatch and CRD hatch locks, hinges, and closure mechanisms	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanisms	10 CFR Part 50, Appendix J and Plant Technical Specifications	No	Consistent with NUREG-1801. The 10 CFR Part 50 Appendix J Program is used to confirm loss of leak tightness of Personnel Airlock, Personnel Emergency Airlock, and the Equipment Hatch in closed position in accordance with the HNP Technical Specifications.
3.5.1-18	Steel penetration sleeves and dissimilar metal welds; personnel airlock, equipment hatch and CRD hatch	Loss of material due to general, pitting, and crevice corrosion	ISI (IWE) and 10 CFR Part 50, Appendix J	No	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. The ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J Programs are used to manage loss of material due to corrosion.
3.5.1-19	BWR Only				
3.5.1-20	BWR Only				
3.5.1-21	BWR Only				
3.5.1-22	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion	ISI (IWL)	No	This item applies to prestressed concrete containments. It is not applicable to the HNP steel-lined reinforced concrete containment.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
Safety Related and Other Structures; and Component Supports					
3.5.1-23	All Groups except Group 6: interior and above grade exterior concrete	Cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete areas for Containment Internal Structures, which includes the Refueling Canal, the Reactor Auxiliary Building, Cooling Tower, CW Intake Structure, Diesel Generator Building, Fuel Handling Building, HVAC Equipment Room, Outside the Power Block Structures, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Waste Processing Building, and Yard structures.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-24	All Groups except Group 6: interior and above grade exterior concrete	Increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage accessible concrete for Containment Internal Structures, which includes the Refueling Canal, Reactor Auxiliary Building, Cooling Tower, CW Intake Structure, Diesel Generator Building, Fuel Handling Building, HVAC Equipment Room, Outside the Power Block Structures, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Waste Processing Building, and Yard Structures.
3.5.1-25	All Groups except Group 6: steel components: all structural steel	Loss of material due to corrosion	Structures Monitoring Program. If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage loss of material due to corrosion for Containment Internal Structures, Reactor Auxiliary Building, Diesel Generator Building, HVAC Equipment Room, Security Building, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Waste Processing Building, and Yard structures structural steel components. Protective coatings are not relied upon to manage the effects of aging.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-26	All Groups except Group 6: accessible and inaccessible concrete: foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Structures Monitoring Program. Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, if not within the scope of the applicant's structures monitoring program or for inaccessible areas of plants located in moderate to severe weathering conditions	Consistent with NUREG-1801, except the aging effect is not applicable to the Containment Internal Structures, which include the Refueling Canal, as discussed in Subsection 3.5.2.2.2.1. The Structures Monitoring Program is used to manage aging effects for accessible concrete for the Reactor Auxiliary, Cooling Tower, CW Intake Structure, Diesel Generator and Diesel Fuel Oil Storage Tank Buildings, the Fuel Handling Building, Outside the Power Block Structures, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Tank Area/Building, Waste Processing Building, and Yard structures. Refer to the additional information applicable to inaccessible areas provided in Subsection 3.5.2.2.2.2.1.
3.5.1-27	All Groups except Group 6: accessible and inaccessible interior/exterior concrete	Cracking due to expansion due to reaction with aggregates	Structures Monitoring Program None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if not within the scope of the applicant's structures monitoring program or concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage cracking of accessible concrete regardless of the aging mechanism. Refer to the further evaluation of inaccessible areas provided in Subsection 3.5.2.2.2.2.2.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-28	Groups 1-3, 5-9: All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	This aging effect is not applicable to the Refueling Canal concrete as discussed in Subsection 3.5.2.2.2.1. In general, the Structures Monitoring Program is used; however, a different aging management program is applied for the Main and Auxiliary Dam and Spillways. Additional information regarding specific structures is provided in Subsection 3.5.2.2.2.2.3.
3.5.1-29	Groups 1-3, 5-9: foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program. If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	This aging effect is not applicable to HNP structures in the scope of License Renewal. Refer to the further evaluation provided in Subsections 3.5.2.2.2.1 and in Subsection 3.5.2.2.2.2.3. A dewatering system is not used for control of settlement or to prevent leaching of cement from concrete.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-30	Group 4: Radial beam seats in BWR drywell; RPV support shoes for PWR with nozzle supports; Steam generator supports	Lock-up due to wear	ISI (IWF) or Structures Monitoring Program	Yes, if not within the scope of ISI or structures monitoring program	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. The Structures Monitoring Program manages lock-up due to wear for Lubrite plates utilized on the Polar Crane support girder. Lubrite plates are not utilized on the RPV or steam generator supports. Refer to Items 3.5.1-53, -54, and -55 below for aging management programs applicable to the RPV and Steam Generator supports.
3.5.1-31	Groups 1-3, 5, 7-9: below-grade concrete components, such as exterior walls below grade and foundation	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack; Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Structures monitoring Program; Examination of representative samples of below-grade concrete, and periodic monitoring of groundwater, if the environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes, plant-specific, if environment is aggressive	Consistent with NUREG-1801, except these aging effects are not applicable to the Refueling Canal concrete as discussed in Subsection 3.5.2.2.2.1. The Structures Monitoring Program is used to manage the aging effects for accessible concrete. Groundwater chemistry is non-aggressive as documented in Subsection 3.5.2.2.2.2.4. Exposed portions of below-grade concrete will be examined when excavated for any reason. Periodic monitoring of groundwater chemistry will be performed.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-32	Groups 1-3, 5, 7-9: exterior above and below grade reinforced concrete foundations	Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide.	Structures Monitoring Program for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801, except this aging effect is not applicable to the Refueling Canal concrete as discussed in Subsection 3.5.2.2.2.1 and except for structures constructed with Non-Class 1 concrete in inaccessible areas. The Structures Monitoring Program is used to manage the aging effects for accessible concrete. Concrete mix design, for Class 1 and Non-Class 1 concrete, is discussed in Subsection 3.5.2.2.2.2.5.
3.5.1-33	Groups 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, plant-specific if temperature limits are exceeded	This aging effect is not applicable to concrete in the following structures: Containment Internal Structures including the Refueling Canal, Reactor Auxiliary Building, Cooling Tower, CW Intake Structure, Diesel Generator Building, Fuel Handling Building, HVAC Equipment Room, Outside the Power Block Structures, Security Building, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, the Waste Processing Building, and Yard structures. Refer to the further evaluation provided in Subsection 3.5.2.2.2.3.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-34	Group 6: Concrete; all	Cracking, loss of bond, loss of material due to corrosion of embedded steel; increase in porosity and permeability, cracking, loss of material due to aggressive chemical attack	Inspection of Water-Control Structures Assoc with Nuclear Power Plants and for inaccessible concrete, exam of rep. samples of below-grade concrete, and periodic monitoring of groundwater, if environment is non-aggressive. Plant specific if environment is aggressive.	Yes, plant-specific if environment is aggressive	The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is used to manage the aging effects of accessible concrete; except that, for the ESW and Cooling Tower Makeup Intake and the ESW Discharge Structures, and the ESW Screening Structure, the RG 1.127 Program and the Structures Monitoring Programs are used. The environment is non-aggressive as discussed in Subsection 3.5.2.2.2.4.1. Exposed portions of below-grade concrete will be examined when excavated for any reason. Periodic monitoring of groundwater and reservoir chemistry will be performed.
3.5.1-35	Group 6: exterior above and below grade concrete foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Inspection of Water-Control Structures Associated with Nuclear Power Plants. Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program, is used to manage the aging effects of accessible concrete; except that, for the ESW and Cooling Tower Makeup Intake and ESW Discharge Structures, and the ESW Screening Structure, both the RG 1.127 Program and the Structures Monitoring Program are used. Further evaluation of inaccessible areas is provided in Subsection 3.5.2.2.2.4.2.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-36	Group 6: all accessible/ inaccessible reinforced concrete	Cracking due to expansion/ reaction with aggregates	Accessible areas: Inspection of Water-Control Structures Associated with Nuclear Power Plants. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is used to manage the aging effect; except that for the ESW and Cooling Tower Makeup Intake, the ESW Discharge Structure, and the ESW Screening Structure, the RG 1.127 Program and the Structures Monitoring Program are used. Further evaluation of inaccessible areas is provided in Subsection 3.5.2.2.2.4.3.
3.5.1-37	Group 6: exterior above and below grade reinforced concrete foundation interior slab	Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide	For accessible areas, Inspection of Water-Control Structures Associated with Nuclear Power Plants. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is used to manage the aging effect; except that for the ESW and Cooling Tower Makeup Intake, the ESW Discharge Structure, and the ESW Screening Structure, the RG 1.127 Program and the Structures Monitoring Program are used. Further evaluation of inaccessible areas is provided in Subsection 3.5.2.2.2.4.3.
3.5.1-38	Groups 7, 8: Tank liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Plant-specific	Yes, plant specific	The Diesel Fuel Oil Storage Tanks are reinforced concrete with carbon steel liners. Additional information is provided in Subsection 3.5.2.2.2.5.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-39	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage loss of material for these components within the Containment Building and for the Reactor Auxiliary and Diesel Generator Buildings, the Diesel Fuel Oil Storage Tank Building, the ESW and Cooling Tower Makeup Intake Structure, the Fuel Handling Building, the HVAC Equipment Room, the Security Building, the ESW Screening Structure, the NSW Intake Structure, the Switchyard Relay Building, Transformer and Switchyard Structures, the Turbine Building, the Tank Area/Building, the Waste Processing Building, and Yard structures. Other commodities, such as, Non-Fire Doors, Fire Hose Stations, and Floor Drains, have been aligned with this line item based on use of the same material, environment, aging effect and aging management program.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-40	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	The Structures Monitoring Program is used to manage reduction in concrete anchor capacity within the following structures: Containment Building, Reactor Auxiliary, Cooling Tower, Diesel Generator Buildings, Diesel Fuel Oil Storage Tank Building, ESW and Cooling Tower Makeup Intake Structure, and Fuel Handling Building, HVAC Equipment Room, Security Building, ESW Screening Structure, NSW Intake Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Tank Area/Building, Waste Processing Building, and Yard structures. However, the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is used to manage reduction in concrete anchor capacity for the Main Dam and Spillway. Refer to the information in Subsection 3.5.2.2.2.6.
3.5.1-41	Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Structures Monitoring Program	Yes, if not within the scope of the applicant's structures monitoring program	This NUREG-1801 item is not applicable. Vibration isolation elements were not utilized in HNP structures within the scope of License Renewal. Refer to the information in Subsection 3.5.2.2.2.6.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-42	Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. A fatigue analysis does not exist in the current licensing basis for the applicable supports. Therefore, no TLAA evaluation is necessary as specified in NUREG-1801. Refer to the information in Subsection 3.5.2.2.2.7.
3.5.1-43	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint shrinkage, creep, and aggressive environment	Masonry Wall Program	No	Consistent with NUREG-1801. The Masonry Wall Program is used to manage cracking of masonry walls in the Containment Building, Reactor Auxiliary and Diesel Generator Buildings, Fuel Handling Building, HVAC Equipment Room, Security Building, Turbine Building, Tank Area/Building, and the Waste Processing Building. In addition, the Fire Protection Program is used to examine specific Masonry Walls identified in the Fire Protection Program within the Reactor Auxiliary Building and the Fuel Handling Building. Masonry Walls in the Containment Building are aligned with NUREG-1801 Item III.A3-11 because they have the same component, material, aging effect, environment, and aging management program.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-44	Group 6 elastomer seals, gaskets, and moisture barriers	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage the aging effect for elastomer components in the Reactor Auxiliary, Diesel Generator, Diesel Fuel Oil Storage Tank Buildings, ESW and Cooling Tower Makeup Intake Structure, Fuel Handling Building, ESW Screening Structure, Tank Area/ Building, Waste Processing Building, Yard structures, and some gaskets located in Containment between the primary shield wall and the secondary shield wall. Although some of these structures are not in Group 6, the alignment is based on the same material, environment, aging effect and aging management program.
3.5.1-45	Group 6: exterior above and below grade concrete foundation; interior slab	Loss of material due to abrasion, cavitation	Inspection of Water-Control Structures Associated with Nuclear Power Plants	No	The RG 1.127, Inspection of Water-Control Structures Program manages the aging effect; except that for the ESW and Cooling Tower Makeup Intake Structure, the ESW Discharge Structure, and the ESW Screening Structure, both the RG 1.127 Program and the Structures Monitoring Program are used. The Structures Monitoring Program alone is used to manage this aging effect/mechanism for the CT, NSW Intake Structure, CW Intake Structure, and the Yard Structures.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-46	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry and Monitoring of spent fuel pool water level and level of fluid in the leak chase channel.	No	Consistent with NUREG-1801 Cracking due to SCC is not an applicable effect for this item because to be susceptible to SCC, stainless steel must be subjected to both high temperature (>140°F) and an aggressive chemical environment. The stainless steel liner is not subject to an aggressive chemical environment and the temperature is normally maintained < 140°F. This aging effect is not applicable to the stainless steel liner plate. For the Spent Fuel Storage Pools, loss of material due to corrosion is managed by the Water Chemistry Program, and by monitoring the water level of the Fuel Pool and level of the fluid in the leak chase chamber located in the Fuel Handling Building. The normal environment for the liner is Air-Indoor and Treated Water. Technical Specifications require a minimum amount of water coverage in the Fuel Pools. A leak detection system is installed for monitoring leakage. (continued)

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-46 (contin-ued)	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry and Monitoring of spent fuel pool water level and level of fluid in the leak chase channel.	No	This NUREG-1801 table line item is specific to the Spent Fuel Pool where spent fuel is stored. However, inside Containment, loss of material due to corrosion for the Reactor Cavity Liner/Refueling Canal Liner/ Expansion Bellows is managed by the Water Chemistry Program during refueling outages when the Reactor Cavity/Refueling Canal is flooded. Monitoring of spent fuel pool water level and level of fluid in the leak chase channel is not applicable inside the Containment Building. Normally the Reactor Cavity Liner/Refueling Canal Liner/ Expansion Bellows are exposed to an Air-Indoor environment. No aging effects are anticipated for these stainless steel components in an air environment as indicated on Table 3.5.2-1 for the component/commodity Steel Components: Fuel Pool Liner (including attachments).

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-47	Group 6: all metal structural members	Loss of material due to general (steel only), pitting and crevice corrosion	Inspection of Water-Control Structures Associated with Nuclear Power Plants. If protective coatings are relied upon to manage aging, protective coating monitoring and maintenance provisions should be included.	No	Consistent with NUREG-1801 for the Main Dam and Spillway. Protective coatings are not relied on for aging management. This NUREG-1801 item is not applicable to the other water control structures because they have no metal structural members to be managed by the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program.
3.5.1-48	Group 6: earthen water control structures - dams, embankments, reservoirs, channels, canals, and ponds	Loss of material, loss of form due to erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, seepage	Inspection of Water-Control Structures Associated with Nuclear Power Plants	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plants Program is used to manage aging effects of loss of material and loss of form for the structures that rely on earth as a structural component.
3.5.1-49	BWR Only				

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-50	Groups B2, and B4: galvanized steel, aluminum, stainless steel support members; welds; bolted connections; support anchorage to building structure	Loss of material due to pitting and crevice corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. The Structures Monitoring Program is used to manage the aging effect for supports in the Reactor Auxiliary Building, ESW and Cooling Tower Makeup Intake Structure, HVAC Equipment Room, ESW Screening Structure, Switchyard Relay Building, Transformer and Switchyard Structures, Turbine Building, Tank Area/ Building, Yard structures, and Cooling Tower. This NUREG-1801 item is not applicable to the Containment Building structures, because it is associated with an Air-outdoor environment. There are no components in the Containment Building in this grouping.
3.5.1-51	Group B1.1: high strength low-alloy bolts	Cracking due to stress corrosion cracking; loss of material due to general corrosion	Bolting Integrity	No	This NUREG-1801 item is not applicable. There are no high tensile strength bolting as defined by yield strength > 150 KSI or low alloy steel bolts (SA193 Grade B7) used for NSSS component supports.
3.5.1-52	Groups B2, and B4: sliding support bearings and sliding support surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	Structures Monitoring Program	No	This NUREG-1801 item is not applicable. There are no B2 or B4 Lubrite or graphitic tool steel components in HNP structures that are monitored by the Structures Monitoring Program.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-53	Groups B1.1, B1.2, and B1.3: support members: welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	ISI (IWF)	No	Consistent with NUREG-1801, HNP applies the ASME Section XI, Subsection IWF Program, with an exception that HNP uses an alternative Code Edition and Addenda. Group B1.3 is not applicable.
3.5.1-54	Groups B1.1, B1.2, and B1.3: Constant and variable load spring hangers; guides; stops	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF)	No	Consistent with NUREG-1801, HNP applies the ASME Section XI, Subsection IWF Program, with an exception that HNP uses an alternative Code Edition and Addenda. Group B1.3 is not applicable.
3.5.1-55	Steel, galvanized steel, and aluminum support members; welds; bolted connections; support anchorage to building structure	Loss of material due to boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Program is applied. Although not support members, Penetration Sleeves, Steel Elements: Liner; Liner Anchors; Integral Attachments, Fire Hose Stations, Floor Drains, and Steel Components: All Structural Steel are aligned with this line item based on use of the same material, environment, aging effect and aging management program.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-56	Groups B1.1, B1.2, and B1.3: Sliding surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF)	No	Consistent with NUREG-1801, with an exception that HNP uses an alternative Code Edition and Addenda. HNP applies the ASME Section XI, Subsection IWF Program for Lubrite sliding surfaces in applicable structures. Group B1.3 is not applicable.
3.5.1-57	Groups B1.1, B1.2, and B1.3: Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	ISI (IWF)	No	This NUREG-1801 item is not applicable to supports in HNP structures. There are no non-metallic vibration isolation elements utilized at HNP.
3.5.1-58	Galvanized steel and aluminum support members; welds; bolted connections; support anchorage to building structure exposed to air indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Some additional components have been included in this item although they are not support members based on use of the same material and environment.

TABLE 3.5.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTERS II AND III OF NUREG-1801 FOR CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Item Number	Component/ Commodity	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1-59	Stainless steel support members; welds; bolted connections; support anchorage to building structure	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. Although not support members, additional components, such as, expansion bellows, structural steel, fuel pool gates and liner, floor drains, and sump screens, are aligned with this line item based on use of the same material and environment.

TABLE 3.5.2-1 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
		Stainless Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
			Containment Air	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Stainless Steel	Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
			Containment Air	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Concrete: Above Grade – Dome; Wall; Ring Girder; Basemat	C-1 C-2 C-3 C-4 C-6 C-7 C-12 C-14	Reinforced Concrete	Air-Outdoor	None	None	II.A1-1 (C-08)	3.5.1-04	I, 502
				Loss of Material, Cracking	ASME Section XI, Subsection IWL	II.A1-2 (C-01)	3.5.1-14	B, 503
				Cracking	ASME Section XI, Subsection IWL	II.A1-3 (C-04)	3.5.1-15	B, 504
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	B

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade – Dome; Wall; Ring Girder; Basemat (continued)	C-1 C-2 C-3 C-4 C-6 C-7 C-12 C-14	Reinforced Concrete	Air-Outdoor	Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	B
				Cracking	Fire Protection and ASME Section XI, Subsection IWL	VII.G-30 (A-92)	3.3.1-66	E
				Loss of Material	Fire Protection and ASME Section XI, Subsection IWL	VII.G-31 (A-93)	3.3.1-67	E
			Air-Indoor	Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	B
				None	None	II.A1-1 (C-08)	3.5.1-04	I, 502
				Cracking	ASME Section XI, Subsection IWL	II.A1-3 (C-04)	3.5.1-15	B, 504
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	B

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Above Grade – Dome; Wall; Ring Girder; Basemat (continued)	C-1 C-2 C-3 C-4 C-6 C-7 C-12 C-14	Reinforced Concrete	Air-Indoor	Cracking	Fire Protection and ASME Section XI, Subsection IWL	VII.G-28 (A-90)	3.3.1-65	E
				Loss of Material	Fire Protection and ASME Section XI, Subsection IWL	VII.G-29 (A-91)	3.3.1-67	E
Concrete: Below Grade – Wall; Basemat	C-1 C-2 C-3 C-6 C-7 C-12 C-14	Reinforced Concrete	Soil	Cracking	ASME Section XI, Subsection IWL	II.A1-3 (C-04)	3.5.1-15	B, 504
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-4 (C-03)	3.5.1-01	B
				Change in Material Properties Cracking Loss of Material	ASME Section XI, Subsection IWL	II.A1-7 (C-05)	3.5.1-01	B, 536
				Cracking	Structures Monitoring	II.A1-5 (C-37)	3.5.1-02	A, 530
				Change in Material Properties	ASME Section XI, Subsection IWL	II.A1-6 (C-02)	3.5.1-15	B
Concrete: Containment Internal	C-2 C-3 C-6 C-7 C-12 C-13 C-14	Reinforced Concrete	Containment Air	None	None	III.A4-1 III.A5-1 (T-10)	3.5.1-33	I. 502

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Containment Internal (continued)	C-2 C-3 C-6 C-7 C-12 C-13 C-14	Reinforced Concrete	Containment Air	Cracking	Structures Monitoring	III.A4-2 III.A5-2 (T-03)	3.5.1-27	A, 504
				Change in Material Properties Cracking Loss of Material	Structures Monitoring	III.A4-3 III.A5-9 (T-04)	3.5.1-23	A
				Change in Material Properties Cracking Loss of Material	Structures Monitoring	III.A4-4 III.A5-10 (T-06)	3.5.1-24	A
				Change in Material Properties Cracking	Structures Monitoring			H, 535
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.1-1 III.B1.2-1 III.B2-1 III.B3-1 III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
Concrete: Foundation	C-2 C-7	Concrete	Soil	None	None	II.A1-8 (C-07)	3.5.1-03	I. 528

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation; subfoundation	C-2	Concrete	Soil	None	None	II.A1-8 (C-07)	3.5.1-03	I. 528
Damper Mountings	C-2 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B4-11 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Expansion Bellows	C-15	Stainless Steel	Containment Air	Fatigue damage	TLAA	II.A3-4 (C-13)	3.5.1-09	C, 506, 533
				None	None	II.A3-2 (C-15)	3.5.1-10	I, 512, 527
				None	None	III.B5-5 (TP-5)	3.5.1-59	C, 507
			Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 506
				None	None	III.A5-13 (T-14)	3.5.1-46	I, 525
Fire Hose Stations	C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 539
			Containment Air	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Floor Drains	C-8	Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
			Containment Air	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
		Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 539
			Containment Air	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Insulation (Hot Piping Penetrations)	C-3	Fiberglass, Hydrous calcium silicate	Containment Air	None	None			J, 509
Integrated Reactor Head Steel Assemblies	C-2 C-6 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
Jib Cranes	C-7	Carbon Steel	Containment Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514
Masonry Walls	C-3 C-14	Concrete Block	Containment Air	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A, 510
Non-Fire Door	C-2 C-7	Carbon Steel	Containment Air	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Penetration Bellows	C-1 C-15	Carbon Steel	Containment Air	Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-1 (C-12)	3.5.1-18	B, 511

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Penetration Bellows (continued)	C-1 C-15	Stainless Steel	Containment Air	None	None	II.A3-2 (C-15)	3.5.1-10	I, 511, 512
				Cracking (Cyclic Loading)	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-3 (C-14)	3.5.1-12	B, 511, 513
				Cumulative Fatigue	TLAA	II.A3-4 (C-13)	3.5.1-09	A, 511, 513, 514
Penetration Sleeves	C-1 C-2 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 516
			Containment Air	Loss of Material	10 CFR Part 50, Appendix J and ASME Section XI Subsection IWE	II.A3-1 (C-12)	3.5.1-18	B
				None	None	II.A3-4 (C-13)	3.5.1-09	I, 518
				Cracking (Cyclic Loading)	10 CFR Part 50, Appendix J and ASME Section XI Subsection IWE	II.A3-3 (C-14)	3.5.1-12	B, 518, 529
		Stainless Steel	Containment Air	None	None	II.A3-2 (C-15)	3.5.1-10	I, 512, 517
				Cracking (Cyclic Loading)	10 CFR Part 50, Appendix J and ASME Section XI Subsection IWE	II.A3-3 (C-14)	3.5.1-12	B, 517, 518, 529

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Penetration Sleeves (continued)	C-1 C-2 C-7	Stainless Steel	Containment Air	None	None	II.A3-4 (C-13)	3.5.1-09	I, 517, 518
			Borated Water Leakage	None	None	III.B4-9 (TP-4)	3.5.1-59	C, 517
		Copper	Containment Air	None	None			J, 519
			Borated Water Leakage	None	None			J, 519
Personnel Airlock; Equipment Hatch	C-1 C-3	Carbon Steel	Air-Indoor	Loss of Leak Tightness in Closed Condition	10 CFR Part 50, Appendix J and Plant Technical Specifications	II.A3-5 (C-17)	3.5.1-17	A, 520
				Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-6 (C-16)	3.5.1-18	B
			Containment Air	Loss of Leak Tightness in Closed Condition	10 CFR Part 50, Appendix J and Plant Technical Specifications	II.A3-5 (C-17)	3.5.1-17	A, 520
				Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-6 (C-16)	3.5.1-18	B

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7 C-11 C-12 C-13 C-14	Aluminum	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-4 (TP-3)	3.5.1-55	A
		Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
		Galvanized Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-4 (TP-3)	3.5.1-55	A
		Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	A
		Aluminum	Containment Air	None	None	III.B5-2 (TP-8)	3.5.1-58	A
		Carbon Steel	Containment Air	Loss of Material	Structures Monitoring	III.B5-7 (TP-30)	3.5.1-39	A
		Galvanized Steel	Containment Air	None	None	III.B5-3 (TP-11)	3.5.1-58	A
		Stainless Steel	Containment Air	None	None	III.B5-5 (TP-5)	3.5.1-59	A
Polar Crane	C-7	Carbon Steel	Containment Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
		Galvanized Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
		Stainless Steel	Borated Water Leakage	None	None	III.B3-6 (TP-4)	3.5.1-59	A
		Carbon Steel	Containment Air	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Containment Air	None	None	III.B3-3 (TP-11)	3.5.1-58	A
		Stainless Steel	Containment Air	None	None	III.B3-5 (TP-5)	3.5.1-59	A
Reactor Cavity Manipulator Crane	C-7	Carbon Steel	Containment Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear (of Rail)	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514
Seals and Gaskets	C-2 C-3 C-7	Elastomer	Containment Air	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 521
Seals, Gaskets, and Moisture Barriers	C-1 C-3	Elastomer	Containment Air	Cracking, Change in Material Properties	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A3-7 (C-18)	3.5.1-16	B, 522, 523

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All structural steel	C-2 C-7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 539
			Containment Air	Loss of Material	Structures Monitoring	III.A4-5 (T-11)	3.5.1-25	A, 515
		Lubrite	Containment Air	Lock-up	Structures Monitoring	III.A4-6 (T-13)	3.5.1-30	C, 524
		Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
			Containment Air	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
Steel Components: Fuel Pool Liner (including attachments)	C-1 C-2 C-7 C-12	Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
			Containment Air	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
			Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 532
				None	None	III.A5-13 (T-14)	3.5.1-46	I, 525
Steel Elements: Liner; Liner Anchors; Integral Attachments	C-1 C-2 C-7 C-12	Carbon Steel	Borated water leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 516
			Containment Air	Loss of Material	ASME Section XI Subsection IWE and 10 CFR Part 50, Appendix J	II.A1-11 (C-09)	3.5.1-06	B

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sump Screens	C-2	Stainless Steel	borated water leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
			Containment Air	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
Supports for ASME Class 1, 2, 3 Piping & Components	C-2, C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1-14 III.B1.2-11 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				None	None	III.B1.1-12 III.B1.2-9 (T-26)	3.5.1-42	A, 534
		Stainless Steel	Borated Water Leakage	None	None	III.B1.1-10 III.B1.2-8 (TP-4)	3.5.1-59	A, 531
			Containment Air	None	None	III.B1.1-9 III.B1.2-7 (TP-5)	3.5.1-59	A, 531
		Lubrite	Containment Air	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-5 III.B1.2-3 (T-32)	3.5.1-56	B, 526

TABLE 3.5.2-1 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CONTAINMENT BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping & Components	C-7 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
			Containment Air	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Supports for Reactor Coolant System Primary equipment (includes RPV, SG, Pressurizer, RCP)	C-2 C-12	Carbon Steel	Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.1-14 (T-25)	3.5.1-55	A
			Containment Air	Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 (T-24)	3.5.1-53	B
				Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	B
				None	None	III.B1.1-12 (T-26)	3.5.1-42	A, 534

TABLE 3.5.2-2 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
		Stainless Steel	Concrete	None	None			J, 501
Battery Rack	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
Concrete: Exterior Above Grade	C-1 C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-1 C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-1 C-2 C-3 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete Foundation	C-1 C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior	C-1 C-2 C-3 C-4 C-7 C-13 C-14	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Roof Slab	C-1 C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Control Room Ceiling	C-7	Incombustible Mineral Fiber	Air-Indoor	None	None			J, 566
Damper Mountings	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air-Indoor	Loss of Material Cracking	Fire Protection			J, 565
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Fire Rated Doors	C-1 C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551
Floor Drains	C-8	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 539
		Stainless Steel	Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Masonry Walls	C-3 C-4 C-7 C-14	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
					Fire Protection	III.A3-11 (T-12)	3.5.1-43	E, 571
Non-Fire Doors	C-1 C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Phase Bus Enclosure Assemblies	C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	VI.A-13 (LP-06)	3.6.1-09	A
		Aluminum	Air-Indoor	None	None	III.B3-2 (TP-8)	3.5.1-58	C, 572
		Stainless Steel	Air-Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	C, 572
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7 C-11 C-13 C-14	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
		Galvanized Steel	Air-Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-4 (TP-3)	3.5.1-55	A
		Stainless Steel	Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
		Galvanized Steel	Air-Outdoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Raised Floor	C-2 C-7	Galvanized Steel	Air-Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
Roof Membrane/ Built-Up	C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seals and Gaskets	C-1 C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seismic Joint Filler	C-4	Elastomer	Air-Indoor	Cracking, Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking, Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All structural steel	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.2-11 (T-25)	3.5.1-55	A
			Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
		Stainless Steel	Borated Water Leakage	None	None	III.B1.1-10 III.B1.2-8 (TP-4)	3.5.1-59	A
			Air-Indoor	None	None	III.B1.1-9 III.B1.2-7 (TP-5)	3.5.1-59	A
		Lubrite	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-5 III.B1.2-3 (T-32)	3.5.1-56	B, 526

TABLE 3.5.2-2 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – REACTOR AUXILIARY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A

TABLE 3.5.2-3 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY RESERVOIR CHANNEL

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-4 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY DAM AND SPILLWAY

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
Concrete: Exterior Above Grade	C- 2 C- 7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-1 (T-18)	3.5.1-34	A
				Loss of Material Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-5 (T-15)	3.5.1-35	A
				Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
			Raw Water	Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-6 (T-16)	3.5.1-37	A
				Loss of Material	RG 1.127, Inspection of Water Control Structures	III.A6-7 (T-20)	3.5.1-45	A

TABLE 3.5.2-4 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY DAM AND SPILLWAY

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C- 2 C- 7	Reinforced Concrete	Soil	Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-4 (T-08)	3.5.1-28	E, 530, 549
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-3 (T-19)	3.5.1-34	A
				Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-6 (T-16)	3.5.1-37	A

TABLE 3.5.2-5 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY RESERVOIR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-6 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – AUXILIARY RESERVOIR SEPARATING DIKE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-7 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Concrete: Exterior Above Grade	C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1 III.B5-1, (T-29)	3.5.1-40	A
			Raw Water	Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-7 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-7 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-7 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe	C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	External Surfaces Monitoring			J, 547
			Raw Water	Loss of Material Cracking Change in Material Properties	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components Program			J, 547
		Asbestos Cement	Air-Outdoor	Loss of Material Cracking Change in Material Properties	External Surfaces Monitoring			J, 547
			Raw Water	Loss of Material Cracking Change in Material Properties	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components Program			J, 547
Supports for Non-ASME Piping & Components	C-7	Stainless Steel	Air-Outdoor	None	None	III.B2-7 (TP-6)	3.5.1-50	I, 573
		Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A

TABLE 3.5.2-8 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – COOLING TOWER MAKEUP WATER INTAKE CHANNEL

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-9 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Concrete: Exterior Above Grade	C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-9 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-9 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – CIRCULATING WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-10 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Battery Rack	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Concrete: Exterior Above Grade	C-2 C-3 C-4 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-2 C-3 C-4 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete Foundation	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior	C-2 C-3 C-4 C-7 C-13	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Roof Slab	C-2 C-3 C-4 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mounting	C-2	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Fire Rated Doors	C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551
Floor Drains	C-8	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Masonry Walls	C-3 C-7	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
			Air-Outdoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Non-Fire Doors	C-6 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Roof Membrane/ Built-Up	C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seals and Gaskets	C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Steel Components: All structural steel	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.1-12 III.B1.2-9 (T-26)	3.5.1-42	A, 534
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-10 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL GENERATOR BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B4-5 (TP-11)	3.5.1-58	A

TABLE 3.5.2-11 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN DAM AND SPILLWAY

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Concrete: Exterior Above Grade	C-2 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-1 (T-18)	3.5.1-34	A
				Loss of Material Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-5 (T-15)	3.5.1-35	A
				Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	RG 1.127, Inspection of Water Control Structures	III.B5-1 (T-29)	3.5.1-40	E, 549
			Raw Water	Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-6 (T-16)	3.5.1-37	A
				Loss of Material	RG 1.127, Inspection of Water Control Structures	III.A6-7 (T-20)	3.5.1-45	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN DAM AND SPILLWAY

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-2 C-7	Reinforced Concrete	Soil	Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-4 (T-08)	3.5.1-28	E, 530, 549
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-3 (T-19)	3.5.1-34	A
				Cracking	RG 1.127, Inspection of Water Control Structures	III.A6-2 (T-17)	3.5.1-36	A, 504
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures	III.A6-6 (T-16)	3.5.1-37	A
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-11 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN DAM AND SPILLWAY

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure	C-7	Carbon Steel	Air-Outdoor	Loss of Material	RG 1.127, Inspection of Water Control Structures	III.A6-11 (T-21)	3.5.1-47	C, 548
Structural Steel (Water Control Structures)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	RG 1.127, Inspection of Water Control Structures	III.A6-11 (T-21)	3.5.1-47	A

TABLE 3.5.2-12 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
Concrete: Exterior Above Grade	C-2 C-3 C-4 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A8-5 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A
Concrete Foundation	C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A, 530
				None	None	III.A8-7 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior	C-2 C-3 C-4 C-7	Reinforced Concrete	Air-Indoor	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A
Concrete Roof Slab	C-2 C-3 C-4 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A8-5 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mounting	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air-Indoor	Cracking Loss of Material	Fire Protection			J, 565
Fire Barrier Penetration Seals	C-4 C-7	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Fire Rated Doors	C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Roof Membrane/ Built-Up	C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24_	3.5.1-53	B
				None	None	III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
		Galvanized Steel	Air-Indoor	None	None	III.B1.2-5 (TP-11)	3.5.1-58	A
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-12 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – DIESEL FUEL OIL STORAGE TANK BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for EDG, HVAC System Components, and Other Miscellaneous Mechanical Equipment (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A

TABLE 3.5.2-13 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Exterior Above Grade	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 550
				Loss of Material Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-5 (T-15)	3.5.1-35	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-2 (T-17)	3.5.1-36	E, 504, 550
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air-Outdoor	Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Raw Water	Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
				Loss of Material	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	E, 550
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-2 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				None	None	III.A6-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
Concrete: Interior	C-2 C-3 C-4 C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 538
				Cracking	Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 538
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Roof Slab	C-2 C-3 C-4 C-6 C-7 C-8	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 538
				Loss of Material Cracking	Structures Monitoring	III.A6-5 (T-15)	3.5.1-35	E, 538
				Cracking	Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 538
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
Damper Mounting	C-2	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Non-Fire Doors	C-6 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.4-7 (TP-6)	3.5.1-50	C, 552
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A

TABLE 3.5.2-13 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seals and Gaskets	C-3	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.1-12 III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-14 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER DISCHARGE CHANNEL

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-15 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER DISCHARGE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade	C-2 C-5 C-6 C-7 C-8 C-12	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 550
				Loss of Material Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-5 (T-15)	3.5.1-35	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-2 (T-17)	3.5.1-36	E, 504, 550
			Raw Water	Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
				Loss of Material	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	E, 550
Concrete: Exterior Below Grade	C-2 C-5 C-6 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550

TABLE 3.5.2-15 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER DISCHARGE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade (continued)	C-2 C-5 C-6 C-7 C-8	Reinforced Concrete	Soil	Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
Concrete Foundation	C-2 C-5 C-7 C-8 C-12	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				None	None	III.A6-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550

TABLE 3.5.2-16 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER INTAKE CHANNEL

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-7 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-17 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
		Stainless Steel	Concrete	None	None			J, 501
Battery Rack	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-6 (TP-3)	3.5.1-55	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B2-9 (TP-4)	3.5.1-59	A
Canal and Pool Gates	C-1	Stainless Steel	Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 545
			Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	A
				None	None	III.A5-13 (T-14)	3.5.1-46	I, 560

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade	C-1 C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA5-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A5-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A5-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-1 C-2 C-3 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A5-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A5-3 (T-08)	3.5.1-28	A, 530. 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A5-7 (T-02)	3.5.1-32	A
Concrete: Foundation	C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A5-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A5-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A5-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A5-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior	C-1 C-2 C-3 C-4 C-7 C-14	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A5-2 (T-03)	3.5.1-27	A, 504
				Change in Material Properties	Structures Monitoring	III.A5-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Roof Slab	C-1 C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A5-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A5-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A5-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mountings	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Expansion Bellows	C-15	Stainless Steel	Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 507
				Fatigue Damage	TLAA	II.A3-4 (C-13)	3.5.1-09	C, 533, 546
			Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 546
				None	None	III.A5-13 (T-14)	3.5.1-46	I, 560
Fire Barrier Assemblies	C-4	Fire Proofing Materials	Air-Indoor	Loss of Material Cracking	Fire Protection			J, 565
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	C, 544
Fire Rated Doors	C-1 C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Floor Drains	C-8	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (TP-25)	3.5.1-55	C, 539
		Stainless Steel	Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540
			Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
Fuel Cask Handling Crane (Includes Rails, Structural Members, Base Plates, Retaining Clips, Fasteners and Attachments to Structure	C-7	Carbon Steel	Air-Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear of Rail	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514
Fuel Handling Bridge Crane (Includes Rails, Structural Members, Base Plates, Retaining Clips, Fasteners and Attachments to Structure	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear of Rail	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Handling Building Auxiliary Crane (Includes Rails, Structural Members, Base Plates, Retaining Clips, Fasteners and Attachments to Structure	C- 7	Carbon Steel	Air-Indoor	Loss of Material	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-3 (A-07)	3.3.1-73	A
				Loss of Material / Wear of Rail	Inspection of Overhead Heavy Load and Light Load Handling Systems	VII.B-1 (A-05)	3.3.1-74	A
				Cumulative Fatigue Damage	TLAA	VII.B-2 (A-06)	3.3.1-01	A, 514
Masonry Walls	C-3 C-4 C-7 C-14	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A5-11 (T-12)	3.5.1-43	A
					Fire Protection	III.A5-11 (T-12)	3.5.1-43	E, 571
New Fuel Storage Rack	C-2 C-10	Stainless Steel	Air-Indoor	None	None	VII.A1-1 (A-94)	3.5.1-59	C, 545
Non-Fire Doors	C-1 C-6 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7 C-14	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B5-8 (T-25)	3.5.1-55	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-8 (T-25)	3.5.1-55	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B3-4 (TP-3)	3.5.1-55	A
		Stainless Steel	Air-Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	A
			Borated Water Leakage	None	None	III.B3-6 (TP-4)	3.5.1-59	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Roof Membrane/ Built-Up	C-3 C-7	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seals and Gaskets	C-1 C-3 C-7	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
			Air-Indoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553, 567
			Treated Water	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553, 567
Seismic Joint Filler	C-4	Elastomer	Air-Indoor	Cracking, Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking, Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Spent Fuel Storage Rack	C-2 C-10	Stainless Steel	Treated Water	Loss of Material	Water Chemistry	III.A5-13 (T-14)	3.5.1-46	C, 569
				None	None	VII.A2-6 (A-96)	3.3.1-39	I, 560
						VII.A2-7 (A-97)	3.3.1-90	I, 560
		Boraflex	Treated Water	Reduction of neutron absorbing capacity	Boraflex Monitoring	VII.A2-2 (A-87)	3.3.1-36	A
						VII.A2-4 (A-86)	3.3.1-87	A
		Boral	Treated Water	Loss of Material	Water Chemistry	VII.A2-3 (A-89)	3.3.1-13	I, 570
						VII.A2-5 (A-88)	3.3.1-13	I, 570
Steel Components: Fuel Pool Liner (including attachments)	C-1 C-2 C-7	Stainless Steel	Borated Water Leakage	None	None	III.B5-6 (TP-4)	3.5.1-59	C, 540
			Air-Indoor	None	None	III.B5-5 (TP-5)	3.5.1-59	C, 540

TABLE 3.5.2-17 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –FUEL HANDLING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: Fuel Pool Liner (including attachments) (continued)	C-1 C-2 C-7	Stainless Steel	Treated Water	Loss of Material	Water Chemistry and Monitoring Cavity Level via Technical Specification	III.A5-13 (T-14)	3.5.1-46	A, 561
					Monitoring Leakage from Leak Chase Channel	III.A5-13 (T-14)	3.5.1-46	A
				None	None	III.A5-13 (T-14)	3.5.1-46	I, 560
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B1.2-11 (T-25)	3.5.1-55	A
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Borated Water Leakage	Loss of Material	Boric Acid Corrosion	III.B2-11 (T-25)	3.5.1-55	A

TABLE 3.5.2-18 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – HVAC EQUIPMENT ROOM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Battery Rack	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Concrete: Interior	C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, (T-29)	3.5.1-40	A

TABLE 3.5.2-18 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – HVAC EQUIPMENT ROOM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Masonry Walls	C-7	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Non-Fire Doors	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Roof Membrane/ Built-Up	C-7	Galvanized Steel	Air-Indoor	None	None	III.B.5-3 (TP-11)	3.5.1-58	C, 559
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.4-7 (T-30)	3.5.1-50	C, 559

TABLE 3.5.2-18 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – HVAC EQUIPMENT ROOM

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Siding	C-7	Galvanized Steel	Air-Indoor	None	None	III.B.5-3 (TP-11)	3.5.1-58	C, 559
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.4-7 (T-30)	3.5.1-50	C, 559
Steel Components: All Structural Steel	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-19 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – OUTSIDE THE POWER BLOCK STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Concrete: Exterior Above Grade	C-2 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	IIIA3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	IIIA3-2 (T-03)	3.5.1-27	A, 504
Concrete: Exterior Below Grade	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – OUTSIDE THE POWER BLOCK STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-2	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I, 502

TABLE 3.5.2-19 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – OUTSIDE THE POWER BLOCK STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Roof Slab	C-2	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	IIIA3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	IIIA3-2 (T-03)	3.5.1-27	A, 504
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Soil	Loss of Material	One-Time Inspection			J, 556

TABLE 3.5.2-20 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – MAIN RESERVOIR

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Earthen Water-Control Structures; Dams, embankments, reservoirs, channels, canals and ponds	C-2 C-5 C-12	Earth	Air-Outdoor	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A
			Raw Water	Loss of Material Loss of Form	RG 1.127, Inspection of Water Control Structures	III.A6-9 (T-22)	3.5.1-48	A

TABLE 3.5.2-21 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Battery Rack	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
Concrete: Exterior Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-21 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502

TABLE 3.5.2-21 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior (continued)	C-7	Reinforced Concrete	Air-Indoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
Concrete Roof Slab	C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
Masonry Walls	C-7	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A

TABLE 3.5.2-21 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A, 558

TABLE 3.5.2-21 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SECURITY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All Structural Steel	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515, 558
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A, 558
Supports for EDG, HVAC System Components, and Other Miscellaneous mechanical Equipment (includes support members, welds, bolted connections, support anchorage to building structure	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A, 557

TABLE 3.5.2-22 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 2 C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Exterior Above Grade	C-2 C-3 C-4 C-6 C-7 C-8 C-13	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 550
				Loss of Material Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-5 (T-15)	3.5.1-35	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	IIIA6-2 (T-17)	3.5.1-36	E, 504, 550
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-22 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-2 C-3 C-4 C-6 C-7 C-8 C-13	Reinforced Concrete	Air-Outdoor	Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A
			Raw Water	Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
				Loss of Material	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-7 (T-20)	3.5.1-45	E, 550
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550

TABLE 3.5.2-22 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-2 C-3 C-7 C-8	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A6-4 (T-08)	3.5.1-28	A, 530
				None	None	III.A6-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-3 (T-19)	3.5.1-34	E, 550
				Cracking	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 550
				Change in Material Properties	RG 1.127, Inspection of Water Control Structures & Structures Monitoring	III.A6-6 (T-16)	3.5.1-37	E, 550
Concrete: Interior	C-2 C-3 C-4 C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 538
				Cracking	Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 538
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-22 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Roof Slab	C-2 C-3 C-6 C-7 C-8	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A6-1 (T-18)	3.5.1-34	E, 538
				Loss of Material Cracking	Structures Monitoring	III.A6-5 (T-15)	3.5.1-35	E, 538
				Cracking	Structures Monitoring	III.A6-2 (T-17)	3.5.1-36	E, 504, 538
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A

TABLE 3.5.2-22 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B.5-3 (TP-11)	3.5.1-58	A
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B.3-3 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552
		Stainless Steel	Air-Outdoor	None	None			I, 573

TABLE 3.5.2-22 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – EMERGENCY SERVICE WATER SCREENING STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seals and Gaskets	C-3 C-7	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	A
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.1-12 III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 III.B1.2-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.1-13 III.B1.2-10 (T-24)	3.5.1-53	B
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-23 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – NORMAL SERVICE WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
Concrete: Exterior Above Grade	C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B2-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-23 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – NORMAL SERVICE WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-7	Reinforced Concrete	Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504
Concrete: Exterior Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-23 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – NORMAL SERVICE WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-23 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – NORMAL SERVICE WATER INTAKE STRUCTURE

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-24 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Battery Rack	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 7	Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
Concrete: Exterior Above Grade	C- 7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-24 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-24 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior (continued)	C-7	Reinforced Concrete	Air-Indoor	None	None	III.A3-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
Non-Fire Doors	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B.3-3 (TP-11)	3.5.1-58	A
Roof Membrane/ Built-Up	C-7	Galvanized Steel	Air-Indoor	None	None	III.B.5-3 (TP-11)	3.5.1-58	C, 559
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.4-7 (T-30)	3.5.1-50	C, 559

TABLE 3.5.2-24 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – SWITCHYARD RELAY BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Siding	C-7	Galvanized Steel	Air-Indoor	None	None	III.B.5-3 (TP-11)	3.5.1-58	C, 559
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.4-7 (T-30)	3.5.1-50	C, 559
Steel Components: All structural steel	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515

TABLE 3.5.2-25 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –TRANSFORMER AND SWITCHYARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		PVC	Concrete	None	None			F, 568
		Wood	Air-Outdoor	Loss of Material Change in Material Properties	Structures Monitoring			F, 562
Concrete: Exterior Above Grade	C-4 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1, (T-29)	3.5.1-40	A

TABLE 3.5.2-25 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –TRANSFORMER AND SWITCHYARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-4 C-7	Reinforced Concrete	Air-Outdoor	Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A, 563
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A, 563
Concrete: Exterior Below Grade	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete Foundation	C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A

TABLE 3.5.2-25 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –TRANSFORMER AND SWITCHYARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation (continued)	C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I, 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1, (T-29)	3.5.1-40	A
Phase Bus Enclosure Assemblies	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	VI.A-13 (LP-06)	3.6.1-09	A
		Aluminum	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	C, 572
		Stainless Steel	Air-Outdoor	None	None			I, 573

TABLE 3.5.2-25 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –TRANSFORMER AND SWITCHYARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552

TABLE 3.5.2-25 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION –TRANSFORMER AND SWITCHYARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Steel Components: All Structural Steel	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
		Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552

TABLE 3.5.2-26 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Battery Rack	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B3-7 (T-30)	3.5.1-39	A
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C- 7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Concrete: Exterior Above Grade	C-2 C-3 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued	C-2 C-3 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Cracking	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1, (T-29)	3.5.1-40	A
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7 C-14	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-2 C-3 C-4 C-7 C-13 C-14	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior (continued)	C-2 C-3 C-4 C-7 C-13 C-14	Reinforced Concrete	Air-Indoor	Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A
Concrete Roof Slab	C-2 C-3 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1, III.B5-1 (T-29)	3.5.1-40	A

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Damper Mountings	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
			Air-Outdoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-2 (A-20)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Fire Rated Doors	C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551
Floor Drains	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Masonry Walls	C-7	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Non-Fire Doors	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	C, 544
Phase Bus Enclosure Assemblies	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	VI.A-13 (LP-06)	3.6.1-09	A
		Aluminum	Air-Indoor	None	None	III.B3-2 (TP-5)	3.5.1-58	C, 572
		Stainless Steel	Air-Indoor	None	None	III.B3-5 (TP-5)	3.5.1-59	C, 572
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connections, support anchorage to building structure)	C-7 C-11	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B5-3 (T-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552
		Stainless Steel	Air-Indoor	None	None	III.B.5-5 (TP-5)	3.5.1-59	A
			Air-Outdoor	None	None			I, 573

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Steel Components: All structural steel	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
			Air-Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.2-9 (T-26)	3.5.1-42	A, 534

TABLE 3.5.2-26 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TURBINE BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for ASME Class 1, 2, 3 Piping & Components (continued)	C-2	Carbon Steel	Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-27 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
Concrete: Exterior Above Grade	C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A8-5 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1, (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-27 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7 C-14	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A
Concrete Foundation	C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A8-2 (T-08)	3.5.1-28	A, 530, 537
				None	None	III.A8-7 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-3 (T-05)	3.5.1-31	A

TABLE 3.5.2-27 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation (continued)	C-2 C-3 C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A8-4 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A8-6 (T-02)	3.5.1-32	A
Concrete: Interior	C-2 C-3 C-4 C-7 C-14	Reinforced Concrete	Air-Indoor	Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A
Concrete Roof Slab	C-2 C-3 C-4 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking	Structures Monitoring	III.A8-1 (T-03)	3.5.1-27	A
				Cracking	Structures Monitoring	III.A8-5 (T-03)	3.5.1-27	A, 504
				Cracking	Fire Protection and Structures Monitoring	VII.G-30 (A-92)	3.3.1-66	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-31 (A-93)	3.3.1-67	A

TABLE 3.5.2-27 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Fire Rated Doors	C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551
Masonry Walls	C-7 C-14	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connect-ions, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B5-3 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552

TABLE 3.5.2-27 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B4-7 (TP-6)	3.5.1-50	C, 552
Roof Membrane/ Built-Up	C-3 C-7	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Supports for ASME Class 1, 2, 3 Piping & Components	C-2	Carbon Steel	Air-Indoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B
				None	None	III.B1.2-9 (T-26)	3.5.1-42	A, 534
			Air-Outdoor	Loss of Mechanical Function	ASME Section XI, Subsection IWF	III.B1.1-2 (T-28)	3.5.1-54	B
				Loss of Material	ASME Section XI, Subsection IWF	III.B1.2-10 (T-24)	3.5.1-53	B

TABLE 3.5.2-27 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – TANK AREA/BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-28 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
		Stainless Steel	Air-Indoor	None	None	III.B2-8 (TP-5)	3.5.1-59	A
Concrete: Exterior Above Grade	C-2 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1, (T-29)	3.5.1-40	A

TABLE 3.5.2-28 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Below Grade	C-2 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete Foundation	C-2 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A

TABLE 3.5.2-28 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation (continued)	C-2 C-7	Reinforced Concrete	Soil	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
Concrete: Interior	C-2 C-4 C-7 C-13 C-14	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I. 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
				Cracking	Fire Protection and Structures Monitoring	VII.G-28 (A-90)	3.3.1-65	A
				Loss of Material	Fire Protection and Structures Monitoring	VII.G-29 (A-91)	3.3.1-67	A

TABLE 3.5.2-28 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Roof Slab	C-2 C-6 C-7 C-14	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B5-1 (T-29)	3.5.1-40	A
Damper Mounting	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B4-10 (T-30)	3.5.1-39	A
Fire Barrier Penetration Seals	C-4	Fire Proofing Materials (Elastomers)	Air-Indoor	Cracking Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19)	3.3.1-61	A

TABLE 3.5.2-28 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Fire Rated Doors	C-4 C-7	Carbon Steel	Air-Indoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-3 (A-21)	3.3.1-63	E, 551
			Air-Outdoor	Loss of Material	Fire Protection and Structures Monitoring	VII.G-4 (A-22)	3.3.1-63	E, 551
Masonry Walls	C-7 C-14	Concrete Block	Air-Indoor	Cracking	Masonry Wall	III.A3-11 (T-12)	3.5.1-43	A
Non-Fire Doors	C-6 C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connect-ions, support anchorage to building structure)	C-4 C-6 C-7 C-14	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A

TABLE 3.5.2-28 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – WASTE PROCESSING BUILDING

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A
		Galvanized Steel	Air-Indoor	None	None	III.B3-3 (TP-11)	3.5.1-58	A
Roof Membrane/ Built-Up	C-7	Elastomers	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seals and Gaskets	C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
Seismic Joint Filler	C-4	Elastomer	Air-Indoor	Cracking, Delamination Separation Change in Material Properties	Fire Protection	VII.G-1 (A-19) VII.G-2 (A-20)	3.3.1-61	A
Steel Components: All structural steel	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

TABLE 3.5.2-29 CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Anchorage / Embedment	C-2 C-7	Carbon Steel	Concrete	None	None			J, 501
Cable Tray, Conduit, HVAC Ducts, Tube Track (includes support members, welds, bolted connections, support anchorage to building structure)	C-2 C-3 C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A
			Soil	Loss of Material	Structures Monitoring			J, 555
		Galvanized Steel	Air-Indoor	None	None	III.B2-5 (TP-11)	3.5.1-58	A
			Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A
		PVC / PVC-coated Steel	Soil	None	None			J, 568
		Stainless Steel	Soil	Loss of Material	Structures Monitoring			J, 555
Concrete: Exterior Above Grade	C-2 C-3 C-6 C-7	Reinforced Concrete	Air-Outdoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	IIIA3-10 (T-06)	3.5.1-24	A
				Loss of Material Cracking	Structures Monitoring	III.A3-6 (T-01)	3.5.1-26	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1 III.B5-1, (T-29)	3.5.1-40	A

TABLE 3.5.2-29 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior Above Grade (continued)	C-2 C-3 C-6 C-7	Reinforced Concrete	Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504
Concrete: Exterior Below Grade	C-2 C-3 C-6 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-29 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete Foundation	C-2 C-3 C-7	Reinforced Concrete	Soil	Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				Cracking	Structures Monitoring	III.A3-3 (T-08)	3.5.1-28	A, 530
				None	None	III.A3-8 (T-09)	3.5.1-29	I, 537
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-4 (T-05)	3.5.1-31	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-5 (T-07)	3.5.1-31	A
				Change in Material Properties	Structures Monitoring	III.A3-7 (T-02)	3.5.1-32	A
			Raw Water	Change in Material Properties	Structures Monitoring Program	III.A3-7 (T-02)	3.5.1-32	A
				Loss of Material	Structures Monitoring Program	III.A6-7 (T-20)	3.5.1-45	E, 542
				Cracking	Structures Monitoring Program	III.A3-2 (T-03)	3.5.1-27	A, 504

TABLE 3.5.2-29 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Interior	C-2 C-3 C-7	Reinforced Concrete	Air-Indoor	Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-9 (T-04)	3.5.1-23	A
				Loss of Material Cracking Change in Material Properties	Structures Monitoring	III.A3-10 (T-06)	3.5.1-24	A
				Cracking	Structures Monitoring	III.A3-2 (T-03)	3.5.1-27	A, 504
				None	None	III.A3-1 (T-10)	3.5.1-33	I, 502
				Reduction in concrete anchor capacity due to local concrete degradation	Structures Monitoring	III.B1.2-1, III.B2-1, III.B3-1, III.B4-1 III.B5-1 (T-29)	3.5.1-40	A
Fire Hose Stations	C-7	Carbon Steel	Air-Indoor	Loss of Material	Structures Monitoring	III.B5-7 (T-30)	3.5.1-39	C, 544
Lighting Poles	C-7	Galvanized Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-7 (TP-6)	3.5.1-50	A, 543
Pipe	C-7	Reinforced Concrete	Raw Water	Cracking Change in Material Properties Loss of Material	Inspection of Internal Surfaces in Miscel-laneous Piping and Ducting Components Program			J, 547

TABLE 3.5.2-29 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pipe (continued)	C-7	Reinforced Concrete	Soil	Cracking Loss of Material Change in Material Properties	Buried Piping and Tanks Inspection Program			J, 547
Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures (includes support members, welds, bolted connect-ions, support anchorage to building structure)	C-2 C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A
		Stainless Steel	Raw Water	Loss of Material	Structures Monitoring			J, 574
Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation (includes support members, welds, bolted connections, support anchorage to building structure)	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.3-7 (T-30)	3.5.1-39	A

TABLE 3.5.2-29 (continued) CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORT - SUMMARY OF AGING MANAGEMENT EVALUATION – YARD STRUCTURES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Seals and Gaskets	C-3 C-7	Elastomer	Air-Outdoor	Cracking, Change in Material Properties	Structures Monitoring	III.A6-12 (TP-7)	3.5.1-44	C, 553
			Soil	None	None			J, 555
Siding	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B.5-7 (T-30)	3.5.1-39	A, 515, 544
Steel Components: All structural steel	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.A3-12 (T-11)	3.5.1-25	A, 515
Supports for Non-ASME Piping & Components	C-7	Carbon Steel	Air-Outdoor	Loss of Material	Structures Monitoring	III.B2-10 (T-30)	3.5.1-39	A

Notes for Tables 3.5.2-1 through 3.5.2-26:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.
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:

501. The HNP AMR methodology concluded that carbon/low alloy steel and stainless steel completely encased in concrete has no aging effect. There is not a corresponding component/commodity in NUREG-1801 Chapter II or III. However, NUREG-1801, Items RP-01, RP-06, EP-5, EP-20, SP-2, SP-13, and AP-19, which apply to carbon steel and stainless steel mechanical piping and components embedded in concrete validate there are no aging effects for stainless steel and carbon steel embedded in concrete.
502. Change in material properties (i.e., Reduction of strength and modulus) due to elevated temperature is not an aging effect because the concrete is not subjected to general area temperatures >150°F or local area temperatures >200°F.
503. Only the portion of the Containment Structure extended above the Reactor Auxiliary Building and the Fuel Handling Building is in the Air-Outdoor environment and subject to freeze-thaw.
504. HNP concrete aggregates were selected per ASTM C33, which uses ASTM C227 and ASTM C295. Inspections performed in accordance with the ASME Section XI, Subsection IWL Program, the Structures Monitoring Program, or the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program will validate the continued absence of cracking due to reactions with aggregates.
505. Not used.

506. The expansion bellows is between the Fuel Transfer Tube and the transfer canal inside the Containment Building. The expansion bellows is not a "Penetration sleeve; Penetration bellows" from NUREG-1801 II.A3-4 but is of the same material, in the same environments, has the same aging effects, and involves a TLAA which is consistent with the AMP column in NUREG-1801. This expansion bellows was determined to have a design cycle life and is evaluated as a TLAA. The expansion bellows is subject to a Containment Air environment normally but is subject to a treated water environment while the Containment Building Refueling Canal is flooded during reactor fuel movements.
507. The Expansion Bellows is aligned with NUREG-1801 Item III.B5-5 as a "Miscellaneous Structure" because it has the same material, environment, aging effect, and aging management program although it is not the same NUREG-1801 component "Support members; welds, bolted connections, support anchorage to building structure."
508. Not used.
509. The AMR methodology concluded that the insulation for hot penetrations, in the Containment Air environment, has no aging effect.
510. The HNP AMR methodology concluded that masonry walls in a Containment Air or Air-Indoor environment have cracking as an aging effect. The aging effect is consistent with NUREG-1801 Item III.A3-11 for Masonry Walls; however, Containment Internal masonry walls are a NUREG-1801 Group III.A4 structure.
511. The only penetration bellows which are in scope of license renewal and credit the IWE Program and the 10 CFR 50 Appendix J Program are the four penetration bellows within the valve chambers. The remaining penetration bellows are located outside the Containment Building and do not function as the containment pressure boundary or serve as a means to perform local leak rate testing on the penetrations. The pressure boundary is inside the containment and uses flued heads and closure plates.
512. The HNP AMR methodology concluded that stainless steel materials for the penetration sleeves, penetration bellows, or expansion bellows do not have cracking due to stress corrosion cracking as an aging effect. SCC of stainless steel in air is only applicable to sensitized stainless steel that is exposed to intermittent wetting and an aggressive environment. Containment Building penetrations, including penetration sleeve (flued heads), bellows, and dissimilar metal welds, are not subject to intermittent wetting and an aggressive environment. The Expansion Bellows between the Reactor Cavity and the Fuel Transfer Tube is subject to periodic wetting during refueling outages but is not subject to an aggressive environment. The fuel transfer tube is considered a Class 2 pipe assembly and is evaluated as a mechanical component in Subsection 2.3.3.47, Refueling System.
513. The penetration bellows inside the valve chambers have a limiting number of cycles and are addressed by Item II.A3-4 (C-13) as a TLAA. The remaining bellows are located outside the Containment Building. The penetration bellows located outside the Containment Building do not have an existing fatigue analysis but are screened out of scope of license renewal. See note 511.
514. This TLAA is further evaluated in Chapter 4.0 of the LRA.
515. The HNP coatings program is not relied upon for managing loss of material due to corrosion.
516. The components "Penetration Sleeves" and "Steel Elements: Liner; Liner Anchors; Integral Attachments" are aligned with III.B5-8 as a Miscellaneous Structure because they have the same material, environment, aging effect and aging management program although they are not the same NUREG-1801 component "Support members; welds, bolted connections, support anchorage to building structure." These components are from NUREG-1801 Items II.A1-11 and II.A3.
517. The only portion of penetrations that is stainless steel is the flued heads which are welded to the carbon steel sleeve.
518. A fatigue analysis for the penetration sleeves does not exist.
519. The HNP AMR methodology concluded that copper materials in an Air-Indoor, Containment Air, or Borated Water Leakage environment have no aging effect. This applies only to cooling fins on the main steam and feedwater penetrations.

520. HNP Technical Specifications include surveillance requirements for containment leak rate testing including the air locks and equipment hatch.
521. The AMR methodology concluded that Elastomers in the Containment between the primary shield wall and the secondary shield are susceptible to the aging effect of cracking and change of material properties due to temperature and radiation. The Seals and Gaskets component for this specific application in the Containment is aligned with III.A6-12; because it has the same material, environment, aging effect, and aging management program, although it is not a NUREG-1801 Group 6 Water Control Structure. There is not a NUREG-1801 Group 4 Seals and Gaskets, and Moisture Barrier component provided in NUREG-1801. Cracking and change in material properties for elastomers result in loss of sealing and are considered equivalent aging effects.
522. The AMR methodology concluded that Elastomers could be susceptible to the aging effect of cracking and change of material properties. However, the structural sealants utilized for Electrical Penetrations will be evaluated by the EQ Program as being acceptable for the period of extended operation. Tests performed in accordance with 10 CFR Part 50, Appendix J Program will validate the pressure boundary intended function for Electrical Penetration structural sealants.
523. The intended function for the Moisture Barrier is to prevent intrusion of moisture between the inaccessible concrete mat and the Containment Liner Plate.
524. The HNP AMR methodology concluded that Lubrite plates have no aging effects, based on low cycle service requirements and a review of industry and plant specific operational experience. However, the Structures Monitoring Program inspects the structural steel bearing plates, including the Lubrite, and is credited for license renewal. This is consistent with NUREG-1801 Item III.A4-6 but these Lubrite plates are not steel components associated with radial beam seats, RPV support shoes, or steam generator supports. This Lubrite material is utilized on the Polar Crane support girder.
525. The AMR methodology concluded that cracking due to SCC is not an applicable aging effect due to temperature of refueling water being maintained below 140°F. Water temperature in cavity is maintained below 140°F during refueling operations.
526. The HNP AMR methodology concluded that Lubrite plates have no aging effects, based on low cycle service requirements and a review of industry and plant-specific operational experience. The ASME Section XI, Subsection IWF and Structures Monitoring Programs do not specifically address Lubrite; however, the inspection criteria for supports within the programs effectively envelope loss of mechanical function by performing a visual examination for scoring, roughness, corrosion, deformation, misalignment, and improper clearances. Therefore, the ASME Section XI, Subsection IWF or Structures Monitoring Programs are credited for inspecting the supports which includes the Lubrite plates.
527. NRC Information Notice 92-02 is not applicable to Expansion Bellows, because the expansion bellows are not part of the containment penetration, not subject to ILRT, and are single-ply rather than two-ply.
528. HNP does not have a porous concrete subfoundation but does have porous concrete drains in a spoke-like pattern under the containment basemat which drain into sumps in the Reactor Auxiliary Building. Refer to FSAR Figure 3.8.5-3. This design is unlike those discussed in Information Notice 97-11 because the basemat is not entirely supported on these porous concrete drains. Also, calcium aluminate was not utilized in the HNP mix design. HNP does not rely a de-watering system for control of erosion of cement from the drains. A structural walkdown did not reveal any structural deficiencies or any unusual settlement. The porous concrete drains at HNP have not exhibited signs of degradation. Therefore this aging effect is not applicable and no aging management is required.
529. The AMR methodology concluded that hot and cold penetrations in Containment Air environment are not susceptible to the aging effect of cracking. Nevertheless, the existing ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J Programs would detect cracking of the penetration sleeves and dissimilar metal welds should it occur and are credited as the license renewal aging management programs.

530. The Containment Building and Class 1 in-scope buildings and structures are supported on unrippable rock. Class 1 structures in the Yard (i.e. electrical manholes, protective cover slabs) are not all supported on sound or unrippable rock. Periodic inspections for these structures have not detected cracking nor is it expected. Additionally, there are non-safety structures that are not supported on unrippable rock, and settlement has been recorded during inspection. Therefore, the Structures Monitoring Program is credited for inspecting concrete structures for settlement and cracking.
531. Includes pipe supports on the Integrated Reactor Vessel Head.
532. NUREG-1801 item III.A5-13 is for the Fuel Pool Liner. This NUREG-1801 line item was selected because the Reactor Cavity liner / Refueling Canal liner in the Containment has the same material, environment (during refueling), aging effects, and AMPs as the Fuel Pool Liner.
533. Expansion bellows welds are stainless steel. There are no dissimilar metal welds from the stainless steel bellows to the stainless steel fuel transfer tube, or to the Reactor Cavity stainless steel liner plate in the Containment or to the Spent Fuel Pool stainless steel liner in the Fuel Handling Building.
534. A fatigue analysis does not exist in the current licensing basis for the supports.
535. The primary shield wall inside face is subject to 3.02E10 Rads over 60 years which exceeds the criteria of 1E10 Rads.
536. NUREG-1801 item II.A1-7 discusses groundwater/soil environment, but soil is not listed in the environment column in NUREG-1801. Therefore, a soil environment has been applied in the environment column of the LRA.
537. HNP does not have a porous concrete subfoundation and does not implement a de-watering system; therefore this aging effect is not applicable and no aging management is required.
538. Although NUREG-1801 recommends Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, HNP utilizes the Structures Monitoring Program.
539. The components "Fire Hose Stations," "Floor Drains," and "Steel Components: All structural steel" are aligned with III.B5-8 as Miscellaneous Structures because they have the same material, environment, aging effect and aging management program, although they are not the same NUREG-1801 component "Support members; welds, bolted connections, support anchorage to building structure." These components are from NUREG-1801 Group III.A4.
540. The components "Steel Components: All structural steel," "Steel Components: Fuel Pool Liner," "Floor Drains," and "Sump Screens" are aligned with III.B5-5 and III.B5-6 as "Miscellaneous Structures" because they have the same material, environment, aging effect and aging management program although they are not the same NUREG-1801 component "Support members; welds, bolted connections, support anchorage to building structure."
541. Not used.
542. The HNP AMR methodology concluded that loss of material (due to abrasion; cavitation) is an applicable aging effect/mechanism. This commodity is aligned with NUREG-1801, III.A6-7 because this aging effect/mechanism is not provided for a Group 3 structure.
543. The HNP Lighting Poles are galvanized steel.
544. The components "Non-fire Doors," "Floor Drains," and "Fire Hose Stations" are aligned with NUREG-1801, Volume 2, Item III.B5-7, as Miscellaneous Structures;" because they have the same material, environment, aging effect and aging management program, although they are not the same NUREG-1801 component, i.e., "Support members; welds, bolted connections, support anchorage to building structure."

545 NUREG-1801 assumes New Fuel Storage Racks are carbon steel, in an Air-Indoor environment, with aging effects. However, the HNP New Fuel Storage Racks are stainless steel. Stainless steel in an Air-Indoor environment has no aging effects. No aging effects are consistent with NUREG-1801 Item III.B5-5.

546 The Expansion Bellows is between the Fuel Transfer Tube and the Transfer Canal inside the Fuel Handling Building. The Expansion Bellows is not a "Penetration sleeve; Penetration bellows" from NUREG-1801 II.A3-4 but is of the same material, in the same environments, has the same aging effects, and involves a TLAA which is consistent with the AMP column in NUREG-1801. This Expansion Bellows was determined to have a design life cycle and is evaluated as a TLAA. The Expansion Bellows is subjected to Air-Indoor and Treated Water environments.

547 The concrete pipe and asbestos cement manifold header are mechanical components utilizing civil materials which do not align with NUREG-1801. The HNP AMR methodology concluded that reinforced concrete and asbestos cement pipe in Soil, Raw Water, and Air-Outdoor environments have the same aging effects as structural concrete. Mechanical aging management programs have been selected to manage the aging effects.

548 The component type “Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Wall Supports, and Other Miscellaneous Structures” is aligned with NUREG-1801 III.A6-11 because it has the same material, environment, aging effects, and aging management program, although it is not the same NUREG-1801 component, i.e., “Metal components: All structural steel.”

549 Although NUREG-1801 recommends the Structures Monitoring Program, HNP utilizes the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program.

550 Although NUREG-1801 recommends Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, HNP utilizes the combination of the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants and Structures Monitoring Programs.

551 Although NUREG-1801 recommends the Fire Protection Program only, HNP utilizes the Fire Protection Program and the Structures Monitoring Program.

552. The AMR methodology concluded that galvanized steel in an Air-Outdoor environment is susceptible to the aging effect of Loss of Material. NUREG-1801 Groups B3, B5, and A3-12 do not have an equivalent material/environment combination to which it can be aligned. Therefore, the miscellaneous structures noted are aligned with III.B4-7 to obtain a consistent aging effect and aging management program.

553. The AMR methodology concluded that elastomers in this environment are susceptible to the aging effect of cracking and change of material properties due to temperature. However, these elastomers are in the Group 3 structures rather than a Group 6 structure (III.A6-12). Cracking and change in material properties for elastomers results in loss of sealing and is considered an equivalent aging effect.

554. Not used.

555. Buried conduits that connect to Class 1 manholes have a designed water tight clamping arrangement. The clamping arrangement provided includes a carbon steel coated support structure, stainless steel clamps, and a neoprene boot. The purpose of the clamping arrangement is to prevent water intrusion into the manholes. Due to the inaccessible location of the arrangement and potential damage to the safety related cable, no inspection is planned for the buried clamping arrangement in the soil. However, degradation of the clamping arrangement leading to water intrusion into the manholes can be determined from inspections performed from inside the manhole. The interior of the manholes will continue to be inspected by the Structures Monitoring Program for water intrusion.

The HNP AMR methodology concluded that the neoprene boot material has no aging effect in soil and that carbon steel and stainless steel in soil have the aging effect of loss of material.

556. The FHB Retaining Wall is held in place by Tie-Rods that are buried in soil and are, therefore, inaccessible. Periodic monitoring of the Tie-Rods has been performed on three occasions during the current 40-year licensing period. The monitoring was performed by way of retrievable Tie-Rod specimens that were located in the same environment as the Tie Rods. No adverse plant-specific operating experience has been recorded for the Tie-Rods. Currently, there are no remaining test specimens available for monitoring.

     For the purpose of the AMR, the Tie-Rods were considered as a miscellaneous structure, and no credit was taken for their epoxy coating. The evaluation determined that the Tie-Rods would have an aging effect of loss of material due to various mechanisms; even though they were specially epoxy coated at the time of installation. Removal and examination of test specimens (at 5, 10, and 15 years per FSAR 3.8.4-42) in same soil environment has not identified any detrimental corrosion. Therefore, based on the positive test results, it is concluded that a one-time inspection should be performed for the upper-most Tie-Rods just prior to the period of extended operation, within two years of 2026. The One-Time Inspection Program is used to determine that the Tie-Rod coatings do not have any degradation that could prevent the Tie-Rods from performing their function.

557. Includes only vibration isolators for the Security Diesel Engine in the Security Diesel room.
558. Only applies to areas within the Security Building that house equipment to operate the Security Diesel Engine for Fire Protection.
559. The components "Siding" and "Roof Membrane/Built-Up" are aligned with III.B5-3 (Air-Indoor) and III.B4-7 (Air-Outdoor) because they have the same material, environment, aging effect, and aging management program although not the same NUREG-1801 component "Support members, welds, bolted connections, support anchorage to building structure."
560. The AMR methodology concluded that cracking due to SCC is not an applicable aging effect due to temperature of the Fuel Pool water being maintained below 140°F. Water temperature is normally maintained between 105°F and 126°F. During fuel shuffle and offloads, administrative controls are in place to maintain temperature of spent fuel pool ≤140°F. The maximum temperature permitted per design is ≤150°F.
561. Technical Specifications maintain at least 23 ft. of water over the top of the fuel rods with irradiated fuel assemblies seated in the storage racks.
562. The HNP methodology concluded that wood exposed to an Air-Outdoor environment had aging effects of Loss of Material and Cracking. The wood provides support to the Oil Filled Cable in the Switchyard and the Transformer Yard.
563. Applies only to the firewalls in the Transformer Yard.
564. The Phase Bus Enclosure Assembly gasket material is able to be examined only when the inspection ports are opened. This occurs when the Enclosure Assembly is disassembled using the Metal Enclosed Bus Program.
565. Fire Barrier component types include the following: Thermo Lag walls, Gypsum Board walls, Cable Fire Wraps, and Cable Tray Breaks.
566. Aging effects for incombustible mineral fiber boards are not identified in either the civil or mechanical tools documents. However, the boards are located in a temperature and humidity controlled area (although not credited for License Renewal); as such, components within that environment are not exposed to the mechanisms and effects required to propagate component degradation. Additionally, a review of the plant operating experience for the control room area has identified no aging effects associated with mineral board fibers.
567. This component type includes the inflatable air seals for the Fuel Handling Railroad Doors and the Fuel Pool Gate Seals.
568. The HNP AMR methodology concluded that PVC encased in concrete, buried in soil, or soil cement has no aging effects.
569. NUREG-1801 item III.A5-13 is for the Fuel Pool Liner. This NUREG-1801 line item was selected because the Spent Fuel Storage Racks in the Fuel Pool have the same material, environment, aging effects, and aging management program as the Fuel Pool Liner.

570. Although NUREG-1801 recommends "Reduction of neutron-absorbing capacity" aging effect for Boral, the HNP AMR evaluation has determined that there has been no adverse plant operating experience recorded. Additionally, both the V. C. Summer Nuclear Plant and the Brunswick Steam Electric Plant have been evaluated by the staff for this aging effect, and the Safety Evaluation Reports for License Renewal for those plants have determined the aging effect to be insignificant. However, the aging effect of Loss of Material will continue to be managed by the Water Chemistry Program.
571. The Fire Protection Program is utilized in addition to the Structures Monitoring Program to examine Masonry Walls for the specific Masonry Walls identified in the Fire Protection Program.
572. The component “Phase Bus Assemblies” is aligned with III.B2-7, because it has the same material, environment, aging effect, and aging management program; although it is not the same NUREG-1801 component “Support members; welds, bolted connections, support anchorage to building structure."
573. The HNP AMR methodology concluded that stainless steel in the Air-Outdoor environment has no aging effect.
574. The HNP AMR methodology concluded that stainless steel in raw water has the aging effect of loss of material.

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 INTRODUCTION

Section 3.6 provides the results of the aging management reviews (AMRs) for those components/commodities identified in Subsection 2.5, Scoping and Screening Results – Electrical and Instrumentation and Control (I&C) Systems that require AMR. The components/commodities subject to AMR are:

1. Non-EQ Insulated Cables and Connections (Subsection 2.5.4.1)

   The commodity Non-EQ Insulated Cables and Connections was divided into the following groups in order to better align with the component types in NUREG-1801 and to include plant-specific commodities. These groups are used in the AMR summary table referenced in Subsection 3.6.2, Results, below:
   a. Cable connections-metallic parts, This commodity group corresponds to cable connections (metallic parts), item VI.A-1 from NUREG-1801,
   b. Insulated Cables and Connections. This commodity group corresponds to conductor insulation for electrical cables and connections, Item VI.A-2 from NUREG-1801,
   c. Cables and Connections Used in Instrumentation Circuits. This group aligns with conductor insulation for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR), Item VI.A-3 from NUREG-1801,
   d. Medium-voltage Power Cables. This corresponds to conductor insulation for inaccessible medium-voltage cables, Item VI.A-4 from NUREG-1801,
   e. High-voltage Power Cables. This component addresses the oil-filled, Paper Insulated Lead Covered (PILC) specialty cables between the 230KV switchyard and the startup transformers at HNP,
   f. Electrical Connector Contacts Exposed to Borated Water, which corresponds to connector contacts for electrical connectors exposed to borated water leakage, Item VI.A-5 from NUREG-1801, and
   g. Fuse Holders. This commodity corresponds to those addressing insulation and metallic parts of fuse holders (not part of a larger assembly), Items VI.A-6, -7 and -8 from NUREG-1801.

2. Metal Enclosed Bus and Connections (Subsection 2.5.4.3)

   The commodity Metal Enclosed Bus (MEB) and Connections was divided into the following groups in order to better align with the component types in NUREG-1801:

   a. MEB - Bus/Connections.
   b. MEB - Enclosure Assemblies.
   c. MEB - Insulation/Insulators.

3. High-voltage Insulators (Subsection 2.5.4.4)

4. Switchyard Bus and Connections (Subsection 2.5.4.5)

5. Transmission Conductors and Connections (Subsection 2.5.4.6)

6. Uninsulated Ground Conductors and Connections (Subsection 2.5.4.8)

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 that are applicable to component/commodity groups in this Section. Table 3.6.1 uses the format of Table 1 described in Section 3.0 above.

3.6.1.1 Operating Experience

The AMR methodology applied at HNP included use of operating experience (OE) to confirm the set of aging effects that had been identified through material/environment evaluations. Plant-specific and industry OE was identified and reviewed. The OE review consisted of the following:

Site: HNP site-specific OE was reviewed. The site-specific OE included a review of (1) the Corrective Action Program Action Tracking Database, (2) the Maintenance Rule Database, (3) Licensee Event Reports, and (4) HNP System Notebooks, and interviews with HNP engineering personnel. The site-specific OE review identified no additional or unique aging effects requiring management.

Industry: Industry OE was obtained from SAND96-0344, “Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations,” September 1996, which consolidates historical maintenance and industry OE for evaluation of aging mechanisms and effects. Additional generic OE is available in Revision 1 of NUREG-1801, "Generic Aging Lessons Learned (GALL)," U. S. Nuclear Regulatory Commission, September 2005. Draft Revision 1 of NUREG-1801 was issued in January 2005. More recent OE was captured by means of the Progress Energy OE review process and by a review of correspondence such as NRC Information Notices and Generic Letters, 10 CFR 21 reports, and vendor and INPO publications. The industry OE review identified no additional aging effects requiring management.

On-Going — On-going review of plant-specific and industry operating experience is continuing to be performed in accordance with the Corrective Action Program and the Progress Energy OE review process.

3.6.2 RESULTS

The following table summarizes the results of the aging management review for components/commodities in the Electrical and I&C Systems area.

Table 3.6.2-1 Electrical and I&C Systems – Summary of Aging Management Evaluation – Electrical/I&C Components/Commodities

This table uses the format of Table 2 described in Section 3.0 above.

3.6.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which specific components/commodities are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each component/commodity in the following subsections.

3.6.2.1.1 Non-EQ Insulated Cables and Connections

Materials

The primary cable and connection insulation materials are:

I&C Cable Insulation

- EPDM
- EPR, EP
- Kerite HTK
- Kerite FR3
- PVC
- PE
- SR
- FEP, Teflon
- ETFE, Tefzel
- XLP, XLPE, XLPO

Power Cable Insulation

- EPR, EP
- Kerite HTK
- Oil Impregnated Paper

Connections

- EPDM
- EPR, EP
- Kapton
- Melamine
- Nylon
- Phenolic
- XLP, XLPE, XLPO

The materials of construction for metallic parts of electrical connections are:

- Various Metals
- Copper Alloys

Environment

The Non-EQ Insulated Cables and Connection components may be exposed to:

- Air - Indoor
- Air - Outdoor
- Adverse Localized Environment caused by Heat, Radiation, or Moisture in the Presence of Oxygen
- Adverse Localized Environment Caused by Exposure to Moisture and Voltage
- Air with Borated Water Leakage

An adverse, localized environment is defined as a condition in a limited plant area that is significantly more severe than the specified service condition for the equipment.

Aging Effects Requiring Management

The Non-EQ Insulated Cables and Connection components are subject to the following aging effects requiring management:

- Loosening of Bolted Connections
- Reduced Insulation Resistance
- Electrical Failure (breakdown of insulation)
- Corrosion of Connector Contact Surfaces

Aging Management Programs

The following AMPs manage the aging effects for the Non-EQ Insulated Cables and Connection components:

- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program
- Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program
- Boric Acid Corrosion Program

3.6.2.1.2 Metal Enclosed Bus and Connections

Materials

The materials of construction for the Metal Enclosed Bus and Connections components are:

- Aluminum

- Silver-Plated Aluminum
- Copper
- Silicone Bronze
- Steel
- Elastomers
- Porcelain
- Fiberglass
- Textolite
- Organic Polymers

Environment

The Metal Enclosed Bus and Connections components are exposed to the following:

- Air - Indoor
- Air - Outdoor

Aging Effects Requiring Management

The following potential Metal Enclosed Bus and Connections aging effects will be managed:

- Loosening of Bolted Connections
- Hardening and Loss of Strength
- Loss of Material
- Reduced Insulation Resistance
- Electrical Failure

Aging Management Programs

The following AMP manages the potential aging effects for the Metal Enclosed Bus and Connections components:

- Metal Enclosed Bus Program

3.6.2.1.3 High-Voltage Insulators

Materials

The materials of construction for the High-Voltage Insulators are:

- Porcelain
- Galvanized metal
- Cement

Environment

The High-Voltage Insulators are exposed to the following:

- Air - Outdoor

Aging Effects Requiring Management

The aging management review of High-Voltage Insulator materials identified no aging effects requiring management.

Aging Management Programs

The aging management review determined that no aging management activities are required for the High-Voltage Insulators.

3.6.2.1.4 Switchyard Bus and Connections

Materials

The materials of construction for the Switchyard Bus and Connections components are:

- Aluminum
- Stainless Steel
- Galvanized Steel

Environment

The Switchyard Bus components are exposed to the following:

- Air - Outdoor

Aging Effects Requiring Management

Switchyard Bus and Connections components are subject to the following aging effects:

- Loss of Material
- Loss of Conductor Strength
- Increased Resistance of Connection

Aging Management Programs

The aging management review determined that the aging effects are not significant and that no aging management activities are required for the Switchyard Bus and Connections.

3.6.2.1.5 Transmission Conductors and Connections

Materials

The materials of construction for the Transmission Conductors and Connections components are:

- Aluminum
- Steel

Environment

The Transmission Conductors and Connections are exposed to the following:

- Air - Outdoor

Aging Effects Requiring Management

The Transmission Conductors and Connections components are subject to the following aging effects requiring management:

- Loss of Material
- Loss of Conductor Strength
- Increased Resistance of Connection

Aging Management Programs

The following AMP manages the potential aging effect for the Transmission Conductors and Connections components:

- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

3.6.2.1.6 Uninsulated Ground Conductors and Connections

Materials

The materials of construction for the Uninsulated Ground Conductors and Connections components are:

- Copper
- Copper Alloy
- Stainless Steel

Environment

The Uninsulated Ground Conductors and Connections components are exposed to the following:

- Air - Outdoor
- Soil

Aging Effects Requiring Management

The aging management review of Uninsulated Ground Conductors and Connections components identified no aging effects requiring management.

Aging Management Programs

The aging management review determined that no aging management activities are required for the Uninsulated Ground Conductors and Connections components.

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 by the reviewer in the LRA. For the Electrical and I&C Systems, those programs are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

As discussed in Section X.E1 of NUREG-1801, aging evaluations performed in accordance with the Environmental Qualification (EQ) Program may involve a time-limited aging analysis (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 EQ TLAAs is addressed separately in Section 4.4.

3.6.2.2.2 Degradation of Insulator Quality Due to Presence of Salt Deposits and Surface Contamination, and Loss of Material Due to Mechanical Wear

Salt and Surface Contamination

In accordance with NUREG-1801, degradation of insulator quality due to the presence of any salt deposits and surface contamination could occur in high-voltage insulators. However, for HNP, degradation of insulator quality is not an aging effect requiring management for the following reasons. Various airborne materials such as dust, salt and industrial effluents can contaminate insulator surfaces. Surface contamination can be a problem in areas where there are greater concentrations of airborne particles due to proximity to facilities that discharge soot or proximity to the ocean where salt spray is prevalent. A large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. The buildup of surface contamination is typically a slow, gradual process that is even slower for rural areas with generally less suspended particles and SO_2 concentrations in the air than urban areas. HNP is located in a rural area, approximately 140 miles inland from the Atlantic coast where airborne particle concentrations are comparatively low, and HNP utilizes a fresh water reservoir for cooling. Consequently, the rate of contamination buildup on the high-voltage insulators at HNP is not considered significant. Any such contamination accumulation is washed away naturally, by rainwater. The glazed surface on the high-voltage insulators aids in the removal of this contamination.

Mechanical Wear

As stated in NUREG-1801, loss of material due to mechanical wear caused by wind could occur in high-voltage insulators. However, for HNP, this is not an aging effect requiring management for the following reasons. Loss of material due to mechanical wear is an aging effect for strain and suspension insulators if they are subject to significant movement. Movement of the insulators can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing; and, when they do because of strong winds, the movement dampens quickly once the wind has subsided. Wear has not been identified during routine inspections of HNP high-voltage insulators. Although rare, surface rust may form where the galvanizing is burnt off due to flashover from lightning strikes. Surface rust is not a significant concern and would not cause a loss of intended function if left unmanaged. It is concluded that loss of material due to wear is not an aging effect requiring management for the high-voltage insulators within the scope of this review.

3.6.2.2.3 Loss of Material Due to Wind-Induced Abrasion and Fatigue, Loss of Conductor Strength Due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload

Switchyard Bus and Connections

HNP Switchyard Bus and Connections were evaluated and determined to have no aging effects requiring management. The switchyard buses within the scope of this review are constructed of rigid 5-inch, schedule 80, aluminum pipe. The switchyard buses are connected to short lengths of flexible conductors that do not normally vibrate and are supported by station post insulators mounted to static, structural components such as cement footings and structural steel. Based on this design configuration, wind induced vibration is not an applicable aging mechanism.

With no connections to moving or vibrating equipment, loss of material due to vibration is not an aging effect requiring management. Aluminum bus exposed to the service conditions of the HNP 230KV Switchyard does not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. Therefore, it is concluded that general corrosion resulting in the oxidation of the switchyard bus is not an aging effect requiring management.

The bolted connections associated with the switchyard bus are for the connections to station post insulators used to support the bus. All other connections to the bus are welded. The components involved in switchyard bus connections are constructed from cast aluminum, galvanized steel, and stainless steel. No organic materials are involved. The station post insulators used to support the switchyard bus are clamped to the bus using an aluminum pad type connector. The station post insulators are then bolted to the clamp connector utilizing either galvanized or stainless steel bolts. Components in the 230KV Switchyard are exposed to precipitation. Connection materials exposed to the service conditions of the HNP 230KV Switchyard do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. The steel bolting hardware used in this application has been selected because of its ability to inhibit rust. Based on operating experience, corrosion of the structural bolting used in this application is not significant enough to cause a loss of intended function.

Transmission Conductors and Connections

The aging effects of loss of material and loss of conductor strength identified in NUREG-1801 do not require management for HNP. Transmission conductor mounting hardware loss of material due to wind induced abrasion and fatigue is an applicable aging mechanism but is not significant enough to cause a loss of intended function. Wind-induced abrasion and fatigue could be caused by transmission conductor vibration resulting from wind loading. However, a high wind loading factor of 90 mph has been considered in the design and installation of transmission conductors and high-voltage insulators in the HNP transmission and distribution network. Strong winds could cause the transmission conductors to sway from side to side. If this swinging is frequent enough, it could cause transmission conductor mounting hardware to wear. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing; and, when they do because of strong winds, the motion dampens quickly once the wind has subsided. Therefore, it is concluded that mounting hardware loss of material caused by transmission conductor vibration (sway) and fatigue is not an aging effect requiring management.

Loss of transmission conductor strength due to corrosion is an applicable aging effect but ample design margin ensures that it is not significant enough to cause a loss of intended function. HNP transmission conductors are Type ACSR (aluminum conductor steel-reinforced). They are constructed of strand aluminum conductors wound around a steel core. No organic materials are involved. The most prevalent mechanism contributing to loss of conductor strength of an ACSR transmission conductor is corrosion, which includes corrosion of the steel core and aluminum strand pitting. For ACSR transmission conductors, degradation begins as a loss of zinc from the galvanized steel core wires. Corrosion rates depend largely on air quality, which includes suspended particles chemistry, SO_2 concentration in air, precipitation, fog chemistry, and meteorological conditions. Corrosion of ACSR transmission conductors is a very slow process that is even slower for rural areas with generally less suspended particles and SO_2 concentrations in the air than urban areas. HNP is located in a rural area where airborne particle concentrations are comparatively low. Consequently, this is not considered a significant contributor to this aging mechanism. There is a set percentage of composite conductor strength established at which a transmission conductor is replaced. The National Electrical Safety Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand under heavy load requirements, which includes consideration of ice, wind, and temperature.

Tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength of an 80-year-old transmission conductor due to corrosion. Assuming a 30% loss of strength, there would still be significant margin between what is required by the NESC and actual conductor strength. These requirements were evaluated for applicability to the specific transmission conductors used at HNP. HNP is in the medium loading zone; therefore, the Ontario Hydroelectric heavy loading zone study is conservative. The HNP transmission conductors with the smallest ultimate strength margin (i.e., 1272 MCM ACSR) were used as an illustration. The ultimate strength of 1272 MCM ACSR is 34,100 lbs and the maximum design tension of 1272 MCM ACSR is 12,000 lbs. The margin between the maximum design tension and the ultimate strength is 22,100 lbs.; i.e., there is a 64.9% ultimate strength margin (22,100/34,100). The Ontario Hydroelectric study showed a 30% loss of composite conductor strength in an 80-year-old conductor. In the case of the 1272 MCM ACSR transmission conductors, a 30% loss of ultimate strength would mean that there would still be a 34.9% ultimate strength margin between what is required by the NESC and the actual conductor strength in an 80-year old conductor. The HNP transmission conductors within the scope of this review have relatively short spans. The longest span is approximately 485 ft. in length. Therefore, the tension exerted on the conductors is less than would be experienced in typical applications, which could be up to 1000 ft. in length. This evaluation shows that there is ample design margin in the transmission conductors at HNP. Based on the conservatism in ultimate strength margin, it is concluded that loss of conductor strength is not an aging effect requiring management for the ACSR transmission conductors within the scope of this review. Therefore, no aging management activities are required for the period of extended operation.

With respect to the NUREG-1801 aging effect of increased resistance of electrical connections, conductor connections are generally of the compression bolted category.

No organic materials are involved. Connection materials exposed to the service conditions of the HNP 230KV Switchyard do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the conductor connection to perform its intended function. HNP transmission conductor connection surfaces are coated with an anti-oxidant compound (a grease-type sealant) prior to tightening the connection to prevent the formation of oxides on the metal surface and to prevent moisture from entering the connection thus reducing the chances of corrosion. Based on operating experience, this method of installation has been shown to provide a corrosion resistant, low electrical resistance connection. Therefore, it is concluded that general corrosion resulting in the oxidation of switchyard connection surface metals is not an aging effect requiring management. The only bolted connections associated with transmission conductors are for the connections to the switchyard bus and for the connections to the high-voltage bushings on the main power transformers. The aluminum bolting hardware used for the connection to the switchyard bus was selected to be compatible with the aluminum connector/conductor coefficient of thermal expansion. This ensures that the contact pressure of the bolt and washer combination used in the connector is maintained to the initial vendor specified torque value. HNP design incorporates the use of stainless steel Belleville washers on the bolted electrical connections to the main power transformers to compensate for temperature changes, maintain the proper torque, and prevent loosening of dissimilar metal connection hardware. This method of assembly is consistent with the good bolting practices recommended in EPRI Technical Report 1003471, "Bolted Joint Maintenance and Applications Guide," December 2002. Connection materials exposed to the service conditions of the HNP 230KV Switchyard may experience minor oxidation and an increased resistance across the electrical connection. To provide reasonable assurance that the electrical continuity function of the connection is maintained, HNP will include the connections in the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. The scope of this program will include the bolted connections on the overhead transmissions conductors from the high-voltage bushings on the main power transformers to the switchyard bus.

3.6.2.2.4 Quality Assurance for Aging Management of Non-Safety Related Components

QA provisions applicable to License Renewal are discussed in Section B.1.3.

3.6.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses (TLAA) identified below are associated with the Electrical and I&C System components. The section of the application that contains the TLAA review results is indicated in parenthesis.

1. Environmental Qualification (Section 4.4, Environmental Qualification of Electrical Equipment)

3.6.3 CONCLUSIONS

The Electrical and I&C System components/commodities having aging effects requiring management have been evaluated, and aging management programs have been selected to manage the aging effects. A description of the aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging will be adequately managed so that there is reasonable assurance that the intended functions of Electrical and I&C Systems components/commodities will be maintained consistent with the current licensing basis during the period of extended operation.

TABLE 3.6.1 SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	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	Further evaluation of EQ TLAAs is documented in Subsection 3.6.2.2.1.
3.6.1-02	Electrical cables, connections and fuse holders (insulation) not subject to 10 CFR 50.49 EQ requirements	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801.
3.6.1-03	Conductor insulation for electrical cables and connections used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance (IR)	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical Cables And Connections Not Subject to 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits	No	Consistent with NUREG-1801. This program applies to cable systems in the Excore Nuclear Instrumentation and Radiation Monitoring Systems.
3.6.1-04	Conductor insulation for inaccessible medium voltage (2KV to 35KV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	Localized damage and breakdown of insulation leading to electrical failure due to moisture intrusion, water trees	Inaccessible medium voltage cables not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-05	Connector contacts for electrical connectors exposed to borated water leakage	Corrosion of connector contact surfaces due to intrusion of borated water	Boric Acid Corrosion	No	Consistent with NUREG-1801.
3.6.1-06	Fuse Holders (Not Part of a Larger Assembly): Fuse holders – metallic clamp	Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation	Fuse holders	No	As discussed in Table 3.6.2-1, the aging effects specified in NUREG-1801 are not applicable. Therefore, no AMP is required.
3.6.1-07	Metal enclosed bus – Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Metal Enclosed Bus	No	Consistent with NUREG-1801.
3.6.1-08	Metal enclosed bus – Insulation/insulators	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Metal Enclosed Bus	No	Consistent with NUREG-1801.
3.6.1-09	Metal enclosed bus – Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program	No	Consistent with NUREG-1801. HNP manages the aging effect with the Structures Monitoring Program. The AMR for this item is performed in Tables 3.5.2-2, 3.5.2-25, and 3.5.2-26.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-10	Metal enclosed bus – Enclosure assemblies	Hardening and loss of strength due to elastomers degradation	Structures Monitoring Program	No	The Metal Enclosed Bus Program is credited for the aging management of elastomer seals associated with the Metal Enclosed Bus enclosure assemblies. The Metal Enclosed Bus Program performs internal inspections of the enclosure assembly for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion which may indicate degradation of the elastomer seal.
3.6.1-11	High-voltage insulators	Degradation of insulation quality due to presence of any salt deposits and surface contamination; Loss of material caused by mechanical wear due to wind blowing on transmission conductors	Plant specific	Yes, plant specific	The aging effects specified in NUREG-1801 are not applicable. Further evaluation of this item is documented in Subsection 3.6.2.2.2.
3.6.1-12	Transmission conductors and connections; switchyard bus and connections	Loss of material due to wind induced abrasion and fatigue; loss of conductor strength due to corrosion; increased resistance of connection due to oxidation or loss of preload	Plant specific	Yes, plant specific	Switchyard Bus and Connections were determined to have no aging effects requiring management. For Transmission Conductors and Connections, HNP applies the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program.Further evaluation is documented in Subsection 3.6.2.2.3.

TABLE 3.6.1 (continued) SUMMARY OF AGING MANAGEMENT EVALUATIONS IN CHAPTER VI OF NUREG-1801 FOR ELECTRICAL COMPONENTS

Item Number	Component/ Commodity	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1-13	Cable Connections – Metallic parts	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Electrical cable connections not subject to 10 CFR 50.49 environmental qualification requirements	No	Consistent with NUREG-1801.
3.6.1-14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

TABLE 3.6.2-1 ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Electrical Equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Various	Various Polymeric and Metallic Materials	Adverse localized environment caused by heat, radiation, oxygen, moisture or voltage	Various degradation/ Various mechanisms	Environmental Qualification of Electric Equipment Program	VI.B-1 (L-05)	3.6.1-01	A
Cable Connections – Metallic Parts	E-1	Various Metals	Air - Indoor Air - Outdoor	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	VI.A-1 (LP-12)	3.6.1-13	A
Non-EQ Insulated Cables and Connections	E-1	Various Organic Polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	VI.A-2 (L-01)	3.6.1-02	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Non-EQ Cables and Connections Used in Instrumentation Circuits Sensitive to a Reduction in Insulation Resistance (IR)	E-1	Various Organic Polymers	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program	VI.A-3 (L-02)	3.6.1-03	A, 601
Medium-Voltage Power Cables	E-1	Various Organic Polymers	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation leading to electrical failure/ moisture intrusion, water trees	Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	VI.A-4 (L-03)	3.6.1-04	A
High-Voltage Power Cables	E-1	Oil-Impregnated Paper Insulated Lead Covered (PILC)	Adverse localized environment caused by exposure to moisture and voltage	None	None			J, 602

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Electrical connector contacts exposed to borated water leakage	E-1	Various Metals	Air with borated water leakage	Corrosion of connector contact surfaces/ intrusion of borated water	Boric Acid Corrosion Program	VI.A-5 (L-04)	3.6.1-05	A
Fuse Holders (Not Part of a Larger Assembly); Insulation	E-2	Insulation Material-Phenolic, Melamine	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation (Thermal/ thermoxidative), of organics/ thermoplastics, radiation-induced oxidation, moisture intrusion and ohmic heating	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	VI.A-6 (LP-03)	3.6.1-02	A, 603
Fuse Holders (Not Part of a Larger Assembly); Insulation	E-2	Insulation Material-Phenolic, Melamine	Air - Indoor	None	None	VI.A-7 (LP-02)	3.6.1-14	A, 603
Fuse Holders (Not Part of a Larger Assembly); Metallic Clamp	E-1	Copper Alloy	Air - Indoor	None	None	VI.A-8 (LP-01)	3.6.1-06	I, 604

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
High-Voltage Insulators	E-2	Porcelain, Galvanized Metals, Cement	Air - Outdoor	None	None	VI.A-9 (LP-07)	3.6.1-11	I, 605
High-Voltage Insulators	E-2	Porcelain, Galvanized Metals, Cement	Air - Outdoor	None	None	VI.A-10 (LP-11)	3.6.1-11	I, 606
Metal Enclosed Bus-Bus/ Connections	E-1	Aluminum/ Silver Plated Aluminum, Copper, Silicone Bronze, Steel	Air - Indoor Air - Outdoor	Loosening of bolted connections/thermal cycling and ohmic heating	Metal Enclosed Bus Program	VI.A-11 (LP-04)	3.6.1-07	A
Metal Enclosed Bus-Enclosure assemblies	E-2	Elastomers	Air - Indoor Air - Outdoor	Hardening and loss of strength/ elastomer degradation	Metal Enclosed Bus Program	VI.A-12 (LP-10)	3.6.1-10	E
Metal Enclosed Bus-Insulation/ insulators	E-2	Porcelain, Phenolic, Textolite, Organic Polymers	Air - Indoor Air - Outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ thermal/ thermoxidative degradation of organics/ thermoplastics, radiation-induced oxidation, moisture/ debris intrusion, and ohmic heating	Metal Enclosed Bus Program	VI.A-14 (LP-05)	3.6.1-08	A

TABLE 3.6.2-1 (continued) ELECTRICAL AND I&C SYSTEMS – SUMMARY OF AGING MANAGEMENT EVALUATION – ELECTRICAL/I&C COMPONENTS/COMMODITIES

Component Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Switchyard Bus and Connections	E-1	Aluminum/ Stainless Steel, Galvanized Steel	Air - Outdoor	Loss of material/ wind induced abrasion and fatigue Loss of conductor strength/ corrosion Increased resistance of connection/ oxidation or loss of preload	None	VI.A-15 (LP-09)	3.6.1-12	I, 607
Transmission Conductors and Connections	E-1	Aluminum, Steel	Air - Outdoor	Loss of material/ wind induced abrasion and fatigue Loss of conductor strength/ corrosion Increased resistance of connection/ oxidation or loss of preload	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	VI.A-16 (LP-08)	3.6.1-12	E, 608
Uninsulated Ground Conductors and Connections	E-1	Copper, Copper Alloy, Stainless Steel	Air - Outdoor, Soil	None	None			I, 609

Notes for Table 3.6.2-1:

Generic 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 item for material, environment, and aging effect, but a different AMP is credited or NUREG-1801 identifies a plant-specific AMP.

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:

601. The scope of this program applies to the non-EQ cable systems in the Excore Nuclear Instrumentation System and Radiation Monitoring System that are sensitive to a reduction in insulation resistance.

602. HNP paper insulated lead covered (PILC) cables use a lead sheath to prevent moisture from penetrating the cable and degrading the cable insulation. The PILC cables are designed with a 0.150 in. thick layer of lead over the cable insulation with an overall jacket of Okolene (polyethylene). The lead sheath combined with the overall polyethylene jacket provides a virtually impenetrable barrier against moisture environments. Beneath the lead wall is the cable insulating medium consisting of oil impregnated paper and metallized paper tape. The impregnation of the paper tape improves the insulation electrical resistance and provides an extra layer of defense against moisture ingress. The highly refined oil used for the insulating medium also serves to dissipate heat from the conductors and cools the cable when operating under load. Site operating experience has shown this design to be extremely reliable in its underground application. The HNP PILC cables are similar in design to the Turkey Point medium-voltage cables that were evaluated and subsequently deemed acceptable in Section 3.7.2.2.3 of NUREG-1759, "Safety Evaluation Report Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 & 4." Therefore, based on their design and operating experience, the PILC cables are considered aptly suited for their service conditions and acceptable for the period of extended operation.

603. Evaluation has shown that the materials used for the fuse holder base (or block) experience no applicable aging effects in their service environment. Therefore, no aging management program is warranted for this item. However, since fuse holders represent another type of electrical connection similar to terminal blocks, fuse holders are included in the Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Program.

604. At HNP, the fuse holders within the scope of this aging management review are used in radiation monitoring instrumentation and control (I&C) circuits. The only fuses that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply applications. I&C circuits characteristically operate at such low currents that no appreciable thermal cycling or ohmic heating occurs. Since thermal cycling and ohmic heating apply to power supply applications, they are not considered applicable aging mechanisms for the I&C fuse holders within the scope of this review. HNP electrical design ensures that stresses due to forces associated with electrical faults and transients are mitigated by the fast action of circuit protective devices at high currents. Mechanical stress due to electrical faults is not considered a credible aging mechanism since such faults are infrequent and random in nature. The fuses within the scope of this evaluation are not routinely removed for maintenance and/or surveillance testing. Therefore, frequent manipulation is not considered an applicable aging mechanism. Vibration is induced in fuse holders by the operation of external equipment, such as compressors, fans, and pumps. Plant walkdown has verified that there are no direct sources of vibration for the fuse holder panels, and the panels are mounted separately to their own unistrut support structure on a concrete wall or column. Therefore, vibration is not considered an applicable aging mechanism. Plant walkdown has verified that there are no potential sources of chemical contamination in the area, and the fuse holders are totally enclosed in a protective junction box even if chemical contamination were possible. Therefore, based on their installed location and design configuration, chemical contamination is not considered an applicable aging mechanism. Plant walkdown has verified that the fuse holders within the scope of this evaluation are totally enclosed in protective junction boxes which are located within the RAB thereby providing two protective barriers to moisture intrusion due to inclement weather. The areas within the RAB which house the fuse holder junction boxes are provided with safety related room cooling. This installed configuration precludes the aging mechanism, as the moisture required to produce corrosion and oxidation is not present in this noncondensing atmosphere. Plant walkdown has also verified that there are no sources of potential mechanical system leakage in proximity to the fuse holder junction boxes within the scope of this evaluation. Therefore, based on their installed location and design configuration, corrosion and oxidation are not considered applicable aging mechanisms.

605. Refer to the further evaluation of degradation of insulator quality provided in Subsection 3.6.2.2.2.

606. Refer to the further evaluation of loss of material provided in Subsection 3.6.2.2.2.

607. Refer to the further evaluation of aging effects for Switchyard Bus and Connections provided in Subsection 3.6.2.2.3.

608. Refer to the further evaluation of aging effects for Transmission Conductors provided in Subsection 3.6.2.2.3.

609 The Uninsulated Ground Conductors and Connections commodity group used for lightning protection includes air terminals (i.e. lightning rods), ground rods, ground cables, and connections. The above grade portions of uninsulated ground conductors are exposed to the outside (yard) environment. Copper materials exposed to this service environment do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of uninsulated ground conductors to perform their intended function. For the below grade portions of uninsulated ground conductors, sulfates and other chemicals in the ground water and soil may accelerate the aging process. However, the results of chemical analysis have determined that the site ground water/soil is non-aggressive. Additionally, the below grade ground cables and connections that come in contact with ground water and soil are coated with a minimum 1/16" layer of lead. The lead coating on the ground cables precludes the potential aging effects. Therefore, no aging management activities are required for the period of extended operation.

4.0 TIME-LIMITED AGING ANALYSES

Two areas of technical review are required to support an application for a renewed operating license. The first area of technical review is the Integrated Plant Assessment, described in Chapters 2 and 3. The second area of technical review is the identification and evaluation of plant-specific time-limited aging analyses and exemptions, provided in this chapter.

The evaluations included in this chapter meet the requirements contained in10 CFR 54.21(c) and allow the NRC to make the finding contained in 10 CFR 54.29(a)(2).

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

10 CFR 54.21(c) requires that an evaluation of time-limited aging analyses (TLAAs) be provided as part of the application for a renewed license. TLAAs are defined in 10 CFR 54.3 as those licensee calculations and analyses that:

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 to be relevant by the licensee in making a safety determination;

5. Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b); and

6. Are contained or incorporated by reference in the current licensing basis.

4.1.1 TIME-LIMITED AGING ANALYSES IDENTIFICATION PROCESS

The process used to identify the HNP-specific TLAAs is consistent with the guidance provided in NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule." Calculations and evaluations that could potentially meet the six criteria of 10 CFR 54.3 were identified by searching CLB documents including:

- Technical Specifications,
- The HNP FSAR,
- Docketed licensing correspondence,
- Design Basis Documents,

- Applicable Westinghouse analyses and reports for steam generator replacement and power uprate, and
- Applicable reactor vessel capsule surveillance reports.

Industry-prepared documents that list generic TLAAs also were reviewed to provide additional assurance of the completeness of the plant-specific list. These documents included NEI 95-10; NUREG-1800, "Standard Review Plan for License Renewal;" NUREG-1801, "Generic Aging Lessons Learned Report;" and License Renewal applications by other PWR licensees.

The potential TLAAs were evaluated by screening against the six criteria in the definition of TLAA in 10 CFR 54.3. The calculations and evaluations that meet all six criteria of 10 CFR 54.3 are the TLAAs for HNP and are listed in Table 4.1-1.

Table 4.1-2 summarizes the results of reviewing the generic list of TLAAs provided on Tables 4.1-2 and 4.1-3 of NUREG-1800.

4.1.2 EVALUATION OF TIME-LIMITED AGING ANALYSES

As required by10 CFR 54.21(c)(1), an evaluation of HNP-specific TLAAs must be performed to demonstrate that:

(i) The analyses remain valid for the period of extended operation;

(ii) The analyses have been projected to the end of the period of extended operation; or

(iii) The effects of aging on the intended functions(s) will be adequately managed for the period of extended operation.

The results of these evaluations are summarized in Table 4.1-1 and discussed in Sections 4.2 through 4.7.

4.1.3 IDENTIFICATION OF EXEMPTIONS

54.21(c) also requires that the application for a renewed license include a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on TLAAs as defined in 10 CFR 54.3. This was performed by evaluating the basis for each active exemption, granted pursuant to 10 CFR 50.12, to determine whether the exemption was based on a TLAA.

As a result of this review, two exemptions were identified as meeting the definition of a TLAA. The first involves an exemption from the provisions to 10CFR50, Appendix A, General Design Criterion 4, with respect to asymmetric blowdown loads resulting from discrete breaks in the Reactor Coolant System (RCS) primary loop by use of Leak-

Before-Break analysis. The second involves an exemption to the requirements of 10 CFR 50.60(a) and 10 CFR 50, Appendix G, to permit the use of Code Case N-640 alternative fracture toughness analysis methods in the development of revised reactor vessel Pressure-Temperature (P-T) curves. The analyses supporting these exemptions meet all the criteria for a TLAA and have been included on Table 4.1-1. See Subsection 4.3.4 for the Leak-Before-Break Analysis and Subsection 4.2.4 for the Operating Pressure-Temperature Limits Analyses which utilize the provisions of Code Case N-640. Subsection 4.2.5 provides a discussion of Low-Temperature Overpressure Limits for License Renewal.

TABLE 4.1-1 TIME-LIMITED AGING ANALYSES

NUREG-1800 TLAA Category	Analysis	10 CFR 54.21(c)(1) Paragraph	Section
1.	**Reactor Vessel Neutron Embrittlement**		4.2
	Neutron Fluence	54.21(c)(1)(ii)	4.2.1
	Upper Shelf Energy Analysis	54.21(c)(1)(ii)	4.2.2
	Pressurized Thermal Shock Analysis	54.21(c)(1)(ii)	4.2.3
	Operating Pressure-Temperature Limits Analysis	54.21(c)(1)(ii)	4.2.4
	Low-Temperature Overpressure-Limits Analysis	Not applicable	4.2.5
2.	**Metal Fatigue**		4.3
	Explicit Fatigue Analysis (NSSS Components)	-	4.3.1
	Reactor Vessel	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.1.1
	Reactor Vessel Internals	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.1.2
	Control Rod Drive Mechanism	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.1.3
	Reactor Coolant Pumps	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.1.4
	Steam Generators	54.21(c)(1)(i), 54.21(c)(1)(ii), 54.21(c)(1)(iii)	4.3.1.5
	Pressurizer	54.21(c)(1)(i), 54.21(c)(1)(ii), 54.21(c)(1)(iii)	4.3.1.6
	Reactor Coolant Pressure Boundary Piping (ASME Class 1)	54.21(c)(1)(i), 54.21(c)(1)(ii), 54.21(c)(1)(iii)	4.3.1.7
	Implicit Fatigue Analysis (ASME Class 2, Class 3, and ANSI B31.1 Piping)	-	4.3.2
	ASME Class 2 and 3 Piping	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.2.1
	ANSI B31.1 Piping	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.3.2.2
	Environmental Fatigue Analysis	-	4.3.3
	RCS Loop Piping Leak-Before-Break Analysis	54.21(c)(1)(ii)	4.3.4
	Cyclic Loads That Do Not Relate to RCS Transients	-	4.3.5
	Primary Sample Lines	54.21(c)(1)(i)	4.3.5.1
	Steam Generator Blowdown Lines	54.21(c)(1)(i)	4.3.5.2
3.	**Environmental Qualification of Electric Equipment**	54.21(c)(1)(iii)	4.4
4.	**Concrete Containment Tendon Prestress**	Not Applicable	4.5

TABLE 4.1-1 (continued) TIME-LIMITED AGING ANALYSES

NUREG-1800 TLAA Category	Analysis	10 CFR 54.21(c)(1) Paragraph	Section
5.	**Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis**		4.6
	Containment Mechanical Penetration Bellows Fatigue	-	4.6.1
	Mechanical Penetration Bellows - Valve Chambers	54.21(c)(1)(i)	4.6.1.1
	Mechanical Penetration Bellows - Fuel Transfer Tube Bellows Expansion Joint	54.21(c)(1)(i)	4.6.1.2
6.	**Other Plant-Specific Time-Limited Aging Analyses**		4.7
	Turbine Rotor Missile Generation Analysis	54.21(c)(1)(ii)	4.7.1
	Crane Cyclic Analyses	-	4.7.2
	Polar Crane	54.21(c)(1)(ii)	4.7.2.1
	Jib Cranes	54.21(c)(1)(ii)	4.7.2.2
	Reactor Cavity Manipulator Crane	54.21(c)(1)(ii)	4.7.2.3
	Fuel Cask Handling Crane	54.21(c)(1)(ii)	4.7.2.4
	Fuel Handling Bridge Crane	54.21(c)(1)(ii)	4.7.2.5
	Fuel Handling Building Auxiliary Crane	54.21(c)(1)(ii)	4.7.2.6
	Main and Auxiliary Reservoir Sedimentation Analysis	54.21(c)(1)(iii)	4.7.3
	High Energy Line Break Location Postulation	54.21(c)(1)(i), 54.21(c)(1)(iii)	4.7.4

TABLE 4.1-2 REVIEW OF GENERIC TLAAs LISTED ON TABLES 4.1-2 AND 4.1-3 OF NUREG-1800

NUREG-1800 Generic TLAA Examples	Applicability to HNP	Section
NUREG-1800, Table 4.1-2		
Reactor vessel neutron embrittlement	Yes	4.2
Concrete containment tendon prestress	No - No prestressing system is employed in the HNP containment design	-
Metal fatigue	Yes	4.3
Environmental qualification of electrical equipment	Yes	4.4
Metal corrosion allowance	No - Did not meet TLAA criteria.	-
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No - No potential TLAA identified.	-
Inservice local metal containment corrosion analyses	No - Did not meet TLAA criteria.	-
High-energy line-break postulation based on fatigue cumulative usage factor	Yes	4.7.4
NUREG-1800, Table 4.1-3		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding.	No – HNP complies with the recommendations of Regulatory Guide 1.43. The fine grained plate and forging materials were clad utilizing the shielded metal arc and the two-wire submerged arc processes which are considered low heat input processes.	-
Low-temperature overpressure (LTOP) analyses	Yes	4.2.5
Fatigue analysis for the main steam supply lines to the turbine driven auxiliary feedwater lines	Yes	4.3.2
Fatigue analysis for the reactor coolant pump flywheel	No - Did not meet TLAA criteria.	-
Fatigue analysis of polar crane	Yes	4.7.2
Flow-induced vibration endurance limit for the reactor vessel internals	No - No potential TLAA identified.	-
Transient cycle count assumptions for the reactor vessel internals	Yes	4.3.1
Ductility reduction of fracture toughness for the reactor vessel internals for the reactor vessel internals	No - No potential TLAA identified.	-
Leak before break	Yes	4.3.4
Fatigue analysis for the containment liner plate	No - No potential TLAA identified.	-
Containment penetration pressurization cycles	No - No fatigue analysis required for Class 2 containment penetration piping.	-
Reactor vessel circumferential weld inspection relief (BWR)	Not applicable.	-

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

Neutron embrittlement is the term used to describe changes in mechanical properties of reactor vessel materials that result from exposure to fast neutron flux (E>1.0 MeV) within the vicinity of the reactor core, called the beltline region. The most pronounced material change is a reduction in fracture toughness. As fracture toughness decreases with cumulative fast neutron exposure, the material's resistance to crack propagation decreases. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence.

Fracture toughness of ferritic materials is not only dependent upon fluence, but is also dependent upon temperature. The reference temperature for nil-ductility transition, RT_{NDT}, is an indicator of the transition temperature range above which the material behaves in a ductile manner, and below which it behaves in a brittle manner. As fluence increases, the nil-ductility reference temperature increases. This means higher temperatures are required for the material to continue to act in a ductile manner. This shift in reference temperature is the ΔRT_{NDT} plus a margin term which is added to account for uncertainties associated with the limited amount of data available for making the projections. Determining the projected reduction in fracture toughness as a function of fluence affects several analyses used to support operation of HNP:

- Reactor Pressure Vessel (RPV) Fluence
- RPV Material Upper-Shelf Energy (USE)
- RPV Pressurized Thermal Shock (PTS)
- RPV Operating Pressure-Temperature (P-T) Limits
- RPV Low-Temperature Overpressurization (LTOP) Setpoints

Since extending the operating period from 40 years to 60 years will further increase the fluence levels, the 60-year fluence value must be determined and used to determine its impact upon the analyses used to support operation. If the existing analyses cannot be demonstrated to remain valid for 60 years, new analyses will be prepared for 60 years for each of these topics, where feasible. If a revised analysis is not feasible, the aging effect identified within the time-limited aging analysis (TLAA) will be managed during the period of extended operation.

4.2.1 NEUTRON FLUENCE

Summary Description

Loss of fracture toughness is an aging effect caused by the neutron embrittlement aging mechanism that results from prolonged exposure to neutron radiation. This process results in increased tensile strength and hardness of the material with reduced toughness. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence. As neutron embrittlement progresses, the toughness/temperature curve shifts down (lower fracture toughness), and the curve shifts to the right (brittle/ductile transition temperature increases). NRC regulations require projections to be made showing the degree of shift expected using end-of-life (EOL) fluence values. A minimum upper shelf energy (USE) value limits the degree of downward shift, and a pressurized thermal shock (PTS) screening criteria (maximum reference temperature) limits the shifting of the ductile/brittle transition temperature to the right. If a projection indicates a shift exceeding these limits could occur in the future, changes must be implemented to either prevent this from occurring, such as improved operational practices, fluence reduction strategies; or further evaluations must demonstrate that equivalent margins of safety exist even with the projected shift.

Analysis

Framatome (now AREVA) has developed a fluence analysis methodology that can be used to accurately predict the fast neutron fluence in the reactor vessel using surveillance capsule dosimetry or cavity dosimetry to verify fluence predictions. The methodology demonstrated that the accuracy of a fluence analysis would be unbiased and have a precision well within the NRC suggested limit of 20%. The calculation based fluence analysis methodology performed by AREVA is compliant with Regulatory Guide (RG) 1.190. This methodology has been demonstrated to accurately predict the fast neutron fluence throughout the internal structures and the vessel of numerous reactors. Following a review of the AREVA methodology, the NRC concluded that the proposed methodology was acceptable for referencing in licensing applications for determining the pressure vessel fluence of Westinghouse-designed reactors. However, licensees referencing the AREVA methodology are required to address three items. For HNP, these are addressed as follows:

1. HNP includes no features that differ from the evaluations that form the basis of the fluence database. Therefore, the uncertainties quoted in the methodology report, BAW-2241, “Fluence and Uncertainty Methodologies,” Revision 1, are consistent with the analysis performed.

2. The cross sections utilized in the calculation are consistent with the evaluation in BAW-2241, Revision 1.

3. For the HNP analysis, no modifications have been made to the methods of the topical report.

Capsule X was removed from the HNP reactor vessel at the end of cycle eight for testing and evaluation. The capsule received an average fast fluence of 3.25×10^{19} neutrons per square centimeter, with energy above 1.0 Million Electron Volts (n/cm^2, E > 1.0 MeV). Based on the calculated eight-cycle-average full power flux and a 90% capacity factor, the projected 40-year end-of-life of 36 effective full power year (36 EFPY) peak fast fluence at the base metal-clad interface of the HNP reactor vessel is 4.55×10^{19} n/cm^2, E > 1.0 MeV. An additional analysis was performed considering the implementation of a 4.5% (to 2900 MWt) power uprate commencing with Cycle 11. Based on the calculated eight-cycle-average full power flux and a 90% capacity factor, the projected 40-year fluence is 4.59×10^{19} n/cm^2, E > 1.0 MeV.

Using the AREVA methodology, the data from Capsule X, and a value of 55 EFPY to account for 60 years of operation, projected values of neutron flux were obtained for use in the fluence-related analyses discussed later in this Section. In addition, the reactor pressure vessel boundary components outside the beltline region have been evaluated to determine whether additional materials should be considered "beltline" material for the period of extended operation. The beltline, as defined by 10 CFR 50.61(a)(3), is the region of the reactor pressure vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor pressure vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection for the most limiting material with regard to radiation damage. The threshold fluence for beltline material is 1×10^{17} n/cm^2, E > 1.0 MeV. The existing AREVA neutron fluence models have been extended to facilitate this evaluation. The materials outside of the traditional beltline region which are expected to receive fluence values greater than 10^{17} n/cm^2 were evaluated, and none of these materials were determined to be limiting.

Therefore, the neutron fluence has been projected to the end of the period of extended operation using a methodology previously approved by the NRC. The 55 EFPY fluence projections will be used for evaluating fluence-based TLAAs for HNP License Renewal.

Disposition: 10 CFR 54.21(c)(1)(ii) – The neutron fluence analyses have been projected to the end of the period of extended operation.

4.2.2 UPPER SHELF ENERGY ANALYSIS

Summary Description

Fracture toughness is a measure of the amount of energy a material can absorb before fracturing. Charpy V-notch tests are used to estimate fracture toughness, and one of the units of measure is ft.-lbs. of absorbed energy. The more ductile a material is, the higher the fracture toughness, which means more ft.-lbs. of energy will be absorbed before fracture. The fracture toughness of reactor vessel steels is temperature-dependent. At low temperatures, the vessel material toughness is relatively low and constant. In this region, the material behaves in a brittle fashion. As the temperature increases, a point is reached where the toughness increases rapidly until another plateau is attained where the toughness is relatively high and constant. In this high toughness region, the material behaves in a ductile fashion. These regions of the curve are referred to as the lower shelf, transition zone, and upper shelf, respectively. The USE is the toughness value (absorbed energy) from the upper shelf portion of the curve (ductile region) for a given material at a given time in its service life. 10 CFR 50, Appendix G, contains screening criteria that limit the degree that the USE value for a reactor pressure vessel material may be allowed to drop due to neutron radiation exposure. The regulation requires the initial USE for a reactor pressure vessel material to be greater than 75 ft.-lb. when the material is in the unirradiated condition, and for the USE to remain above 50 ft.-lb. in the fully irradiated condition throughout the licensed life of the vessel, unless it is demonstrated that lower values of energy will provide margins of safety against fracture equivalent to those required by the ASME Code, Section XI, Appendix G.

Analysis

An evaluation of the HNP RPV for the License Renewal period (55 EFPY) USE for the HNP reactor vessel beltline materials was performed using the guidelines in RG 1.99, Revision 2. The evaluations for the decreases in USE of the HNP reactor vessel were performed at the 1/4T wall location of each beltline material using the respective copper contents and Figure 2 of RG 1.99, Revision 2. The results of the evaluations are provided on Table 4.2-1. The HNP RV beltline material with the lowest predicted USE is the intermediate shell plate, heat number B4197-2, however, the predicted value for this material is not projected to fall below the required 50 ft-lb limit. Therefore, the analyses for the decreases in USE of the HNP RV have been projected to the end of the 60-year period of extended operation. The analyses demonstrate that, for the most limiting material, the lowest predicted USE is greater than the 10 CFR 50, Appendix G, limit of 50 ft-lbs.

Disposition: 10 CFR 54.21(c)(1)(ii) – The analysis of Upper Shelf Energy has been projected to the end of the period of extended operation.

4.2.3 PRESSURIZED THERMAL SHOCK ANALYSIS

Summary Description

10 CFR 50.61 defines screening criteria for embrittlement of reactor pressure vessel materials in pressurized-water reactors, as well as actions that are required if these screening criteria are exceeded. The screening criteria limit the degree that a vessel material may increase in its reference temperature for pressurized thermal shock - RT_{PTS}, following neutron irradiation of the reactor pressure vessel. For circumferential welds, the pressurized thermal shock (PTS) screening criterion is 300°F maximum. For

plates, forgings, and axial weld materials, the screening criterion is 270°F maximum. The projected EOL RT_{PTS} values must be shown to remain below the applicable screening temperature.

A PTS evaluation for the HNP reactor vessel beltline materials was performed to account for 40 years of operation (36 EFPY) in accordance with 10 CFR50.61. Before power uprate, the controlling beltline material for the HNP reactor vessel with respect to PTS was the intermediate shell plate, heat number B4197-2, with a RT_{PTS} value of 196.1°F, which is well below the PTS screening criterion of 270°F. The results of the PTS evaluation demonstrate that the HNP reactor vessel beltline materials will not exceed the PTS screening criteria before end of life (36 EFPY). The results of the PTS evaluation to account for the 4.5% (to 2900 MWt) power uprate commencing with Cycle 11, demonstrated that the HNP reactor vessel beltline materials will not exceed the PTS screening criteria before end-of-life (36 EFPY). The controlling beltline material for the HNP reactor vessel is the intermediate shell plate, heat number B4197-2, with a RT_{PTS} value of 196.2°F.

Analysis

A PTS evaluation for the HNP RV beltline materials was performed in accordance with 10 CFR 50.61. The PTS reference temperature RT_{PTS} values are calculated by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT} and the margin term to cover the uncertainties in the values of initial RT_{NDT} copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective RV beltline materials copper and nickel contents and the neutron fluence applicable to the HNP RV for License Renewal at 55 EFPY.

The evaluations for the HNP RT_{PTS} values were performed for each HNP reactor vessel beltline material with chemistry factors determined from Tables 1 and 2 in 10 CFR 50.61. In addition, the chemistry factors for the intermediate shell plate, heat no. B4197-2, and the intermediate shell to lower shell circumferential weld are recalculated using the available HNP surveillance data.

The RT_{PTS} values for the HNP RV beltline materials at 55 EFPY were determined. The results of the PTS evaluation, as shown on Table 4.2-2, demonstrate that the HNP RV beltline materials will not exceed the PTS screening criteria before the end of the period of extended operation. The controlling beltline material for the HNP reactor vessel with respect to PTS is the intermediate shell plate, heat number B4197-2, with a RT_{PTS} value of 199.9°F which is well below the PTS screening criterion of 270°F.

Disposition: **10 CFR 54.21(c)(1)(ii) – The analyses for the shift in PTS reference temperature of the HNP RV have been projected to the end of the period of extended operation.**

4.2.4 OPERATING PRESSURE-TEMPERATURE LIMITS ANALYSIS

Summary Description

The Adjusted Reference Temperature (ART) is the value of Initial RT_{NDT} + ΔRT_{NDT} + margins for uncertainties at a specific location. Neutron embrittlement increases the ART. Thus, the minimum temperature at which a reactor vessel is allowed to be pressurized increases over the licensed period. The ART of the limiting beltline material is used to correct the beltline Pressure-Temperature (P-T) limits to account for radiation effects. 10 CFR Part 50 Appendix G requires reactor vessel thermal limit analyses to determine operating P-T limits for boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences. Operating limits for pressure and temperature are required for three categories of operation: 1) hydrostatic pressure tests and leak tests, 2) non-nuclear heat-up/cooldown and low level physics tests, and 3) core critical operation.

10 CFR 50, Appendix G, provides P-T limits and minimum temperature requirements for the reactor vessel. The P-T limits and minimum temperature requirements are defined by operating condition, vessel pressure, whether or not fuel is in the vessel, and whether the core is critical. The P-T limits must be at least as conservative as limits obtained by following the methods of analysis and margins of safety of Appendix G of Section XI of the ASME Code. The minimum temperature requirements pertain to the controlling material, which is either the material in the closure flange or the material in the beltline region with the highest reference temperature.

Analysis

The ART values for the HNP reactor vessel beltline region materials are calculated in accordance with RG 1.99, Revision 2, by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT}, and a margin term to cover the uncertainties in the values of initial RT_{NDT}, copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective reactor vessel beltline materials copper and nickel contents and the neutron fluence applicable to 55 EFPY. The evaluations for the HNP ART were performed at the 1/4T and 3/4T wall location of each beltline material with chemistry factors determined from Tables 1 and 2 in RG 1.99, Revision 2. In addition, the chemistry factors for the intermediate shell plate, heat no. B4197-2, and the intermediate shell to lower shell circumferential weld are recalculated using the available HNP surveillance data.

In this manner, ART results for the HNP reactor vessel beltline region materials applicable to 55 EFPY are determined. The pressure-temperature operating limits were calculated using approved procedures and established methods and techniques in accordance with the requirements of 10 CFR 50 Appendix G, ASME Code Section XI Appendix G, ASME Code Case N-640, and ASME Code Case N-588. Based on these results, the controlling beltline material for the HNP reactor vessel is the intermediate shell plate, heat no. B4197-2. Refer to the results presented on Table 4.2-3. The P-T limit curves show that adequate operating margins will be provided.

Disposition: 10 CFR 54.21(c)(1)(ii) – The P-T limits analysis for HNP has been projected to the end of the period of extended operation.

4.2.5 LOW-TEMPERATURE OVERPRESSURE LIMITS ANALYSIS

Summary Description

ASME Section XI, Appendix G, establishes procedures and limits for RCS pressure and temperature primarily for low temperature conditions to provide protection against non-ductile failure of the RV. The Low Temperature Overpressure Protection System (LTOPS) assures that these limits are not exceeded when it is enabled at low temperatures. This temperature is conservatively selected at ≤ 325°F.

Analysis

No analysis of LTOP setpoints has been performed to support operation to the end of the period of extended operation for License Renewal. The LTOP setpoint analysis will be recalculated following the removal of one of the remaining surveillance capsules from the vessel. The surveillance capsule will be removed when the calculated fast neutron fluence on the capsule meets or exceeds the calculated fast neutron fluence on the vessel wall at the end of the period of extended operation.

TABLE 4.2-1 UPPER SHELF ENERGY (C_VUSE) EVALUATION THROUGH YEAR 60 (55 EFPY)

Material Description			Cu wt%	¼T Fluence(1) (x 10^{19}) n/cm^2	Initial C_VUSE ft-lbs	Predicted C_VUSE Per R.G. 1.99, Revision 2	
Reactor Vessel Beltline Region Location	Heat Number	Type				C_VUSE ft-lbs	% Decrease
Intermediate Shell Plate (IS)	A9153-1	SA-533 Gr. B1	0.09	4.209	83	62.0	25.3
Intermediate Shell Plate (IS)	B4197-2	SA-533 Gr. B1	0.09	4.209	71	52.8(2)	25.6(2)
Lower Shell Plate (LS)	C9924-1	SA-533 Gr. B1	0.08	4.098	98	74.7	23.8
Lower Shell Plate (LS)	C9924-2	SA-533 Gr. B1	0.08	4.098	88	67.1	23.8
IS Longitudinal Weld (Both 100%)	4P4784	ASA/Linde 124	0.05	1.67	94	73.8	21.5
IS to LS Circumferential Weld (100%)	5P6771	ASA/Linde 124	0.03	4.063	80	57.1(2)	28.6(2)
LS Longitudinal Weld (Both 100%)	4P4784	ASA/Linde 124	0.05	1.624	94	74.0	21.3

1. Calculated based on guidelines in RG 1.99, Revision 2. The inside surface fluence is the calculated value at the "wetted" surface of the reactor vessel. The ¼T location fluence value is determined by calculating the ¼T depth into the vessel and adding the minimum cladding thickness.
2. Calculated using surveillance data in accordance with RG 1.99, Revision 2, Position 2.2 (i.e., fitting the surveillance data with a line drawn parallel to the existing lines in Figure 2 as the upper bound of all the data).

TABLE 4.2-2 PTS REFERENCE TEMPERATURE EVALUATION THROUGH YEAR 60 (55 EFPY)

Material Description				Chemical Composition		Initial RT_{NDT}	Chemistry Factor	55 EFPY Fluence at Clad-Base Metal Interface 10^{19} n/cm^{2}(1)	Fluence Factor	ΔRT_{PTS} °F	Margin °F	RT_{PTS} °F	Screening Criteria
Reactor Vessel Beltline Region Location	Material ID	Heat Number	Type	Cu wt%	NI wt%								
RT_{PTS} Calculation Per 10 CFR 50.61 Using Tables													
Intermediate Shell (IS) Plate	A9153-1	A9153-1	SA-533 Gr. B1	0.09	0.46	+60	58.0	6.803	1.458	84.6	34.0	178.6	270
Intermediate Shell (IS) Plate	B4197-2	B4197-2	SA-533 Gr. B1	0.09	0.50	+91	58.0	6.803	1.458	84.6	34.0	209.6	270
Lower Shell (LS) Plate	C9924-1	C9924-1	SA-533 Gr. B1	0.08	0.47	+54	51.0	6.631	1.454	74.2	34.0	162.2	270
Lower Shell (LS) Plate	C9924-2	C9924-2	SA-533 Gr. B1	0.08	0.47	+57	51.0	6.631	1.454	74.2	34.0	165.2	270
IS Longitudinal Welds (Both 100%)	BC/BD	4P4784	ASA/Linde 124	0.05	0.91	-20	68.0	2.709	1.266	86.1	56.0	122.1	270
IS to LS Circumferential Weld (100%)	AB	5P6771	ASA/Linde 124	0.03	0.94	-20	41.0	6.575	1.453	59.6	56.0	95.6	300
LS Longitudinal Welds (Both 100%)	BA/BB	4P4784	ASA/Linde 124	0.05	0.91	-20	68.0	2.639	1.260	85.7	56.0	121.7	270
RT_{PTS} Calculation Per 10 CFR 50.61 Using Surveillance Data													
Intermediate Shell (IS) Plate	B4197-2	B4197-2	SA-533 Gr. B1	0.09	0.50	+91	51.4	6.803	1.458	74.9	34.0(2)	[199.9]	270
IS to LS Circumferential Weld (100%)	AB	5P6771	ASA/Linde 124	0.03	0.94	-20	49.1	6.575	1.453	71.3	28.0	79.3	300

1. The inside surface fluence is connected to the clad-base metal interface of the reactor vessel; attenuation through the cladding is based on deterministic methods.
2. Since two of the six surveillance data points are not credible, a full margin value is used to calculate the RT_{PTS} value.

[ ] - Controlling values of the pressurized thermal shock reference temperature.

TABLE 4.2-3 ADJUSTED REFERENCE TEMPERATURE EVALUATION THROUGH YEAR 60 (55 EFPY)

Material Description				Chemical Composition		Initial RT_{NDT}	Chemistry Factor	55 EFPY Fluence 10^{19} n/cm^2			ΔRT_{NDT}, °F at 55 EFPY		Margin		ART, °F at 55 EFPY	
Reactor Vessel Beltline Region Location	Material ID	Heat Number	Type	Cu wt%	Ni wt%			Inside surface	¼T(1) Location	¾T(1) Location	¼T Location	¾T Location	¼T Location	¾T Location	¼T Location	¾T Location
RG 1.99, Revision 2, Position 1.1																
Intermediate Shell (IS) Plate	A9153-1	A9153-1	SA-533 Gr. B1	0.09	0.46	+60	58.0	6.905	4.209	1.661	79.3	66.1	34.0	34.0	173.3	160.1
Intermediate Shell (IS) Plate	B4197-2	B4197-2	SA-533 Gr. B1	0.09	0.50	+91	58.0	6.905	4.209	1.661	79.3	66.1	34.0	34.0	204.3	191.1
Lower Shell (LS) Plate	C9924-1	C9924-1	SA-533 Gr. B1	0.08	0.47	+54	51.0	6.722	4.098	1.617	69.4	57.8	34.0	34.0	157.4	145.8
Lower Shell (LS) Plate	C9924-2	C9924-2	SA-533 Gr. B1	0.08	0.47	+57	51.0	6.722	4.098	1.617	69.4	57.8	34.0	34.0	160.4	148.8
IS Longitudinal Welds (Both 100%)	BC/BD	4P4784	ASA/Linde 124	0.05	0.91	-20	68.0	2.739	1.670	0.659	77.6	60.0	56.0	56.0	113.6	96.0
IS to LS Circumferential Weld (100%)	AB	5P6771	ASA/Linde 124	0.03	0.94	-20	41.0	6.665	4.063	1.603	55.8	46.3	55.8	46.3	91.6	72.6
LS Longitudinal Welds (Both 100%)	BA/BB	4P4784	ASA/Linde 124	0.05	0.91	-20	68.0	2.664	1.624	0.641	77.1	59.5	56.0	56.0	113.1	95.5
RG 1.99, Revision 2, Position 2.1																
Intermediate Shell (IS) Plate	B4197-2	B4197-2	SA-533 Gr. B1	0.09	0.50	+91	51.4	6.905	4.209	1.661	70.3	58.6	34.0(2)	34.0(2)	[195.3]	[183.6]
IS to LS Circumferential Weld (100%)	AB	5P6771	ASA/Linde 124	0.03	0.94	-20	49.1	6.665	4.063	1.603	66.8	55.5	28.0	28.0	74.8	63.5

1. Calculated based on guidelines in RG 1.99, Revision 2. The inside surface fluence is the calculated value at the "wetted" surface of the reactor vessel. The ¼T and ¾T location fluence values are determined by calculating the ¼T and ¾T depth into the vessel and adding the minimum cladding thickness.
2. Since two of the six surveillance data points are not credible, a full margin value is used to calculate the ¼T and ¾T ART values.

[ ] - Controlling values of the adjusted reference temperature.

4.3 METAL FATIGUE

Several thermal and mechanical fatigue analyses of plant mechanical components have been identified as time-limited aging analyses (TLAAs) for HNP. These are discussed in the following Subsections.

Subsection	TLAA
4.3.1	Explicit Fatigue Analyses (NSSS Components)
4.3.1.1	Reactor Vessel
4.3.1.2	Reactor Vessel Internals
4.3.1.3	Control Rod Drive Mechanism
4.3.1.4	Reactor Coolant Pumps
4.3.1.5	Steam Generators
4.3.1.6	Pressurizer
4.3.1.7	Reactor Coolant Pressure Boundary Piping (ASME Class 1)
4.3.2	Implicit Fatigue Analysis (ASME Class 2, Class 3, and ANSI B31.1 Piping)
4.3.2.1	ASME Class 2 and Class 3 Piping
4.3.2.2	ANSI B31.1 Piping
4.3.3	Environmentally-Assisted Fatigue Analysis
4.3.4	RCS Loop Piping Leak-Before-Break Analysis
4.3.5	Cyclic Loads That Do Not Relate to RCS Transients
4.3.5.1	Primary Sample Lines
4.3.5.2	Steam Generator Blowdown Lines

4.3.1 EXPLICIT FATIGUE ANALYSES (NSSS COMPONENTS)

The HNP approach is to identify the latest design fatigue analyses associated with each NSSS component within the RCPB in order to demonstrate that the design analyses will remain bounding through the period of extended operation. Components within the scope of this review include non-pressure boundary reactor internals components.

Original fatigue design calculations assumed a large number of design transients corresponding to relatively severe system dynamics over the original 40-year design life. In general, actual plant operations have resulted in only a fraction of the originally expected fatigue duty. The HNP approach extrapolated the actual operating experience through the period of extended operation to produce a projected fatigue usage that is bounded by the original design assumptions. To support this approach, an assessment was made of the actual fatigue duty to-date for plant components. The end date selected for determining to-date fatigue usage for this evaluation was October 18, 2004.

The first step in the evaluation was to establish the current design basis for the major NSSS components. This was done by reviewing the current design transients and past operational transients. This review showed that the use of transients provided by the HNP steam generator replacement/uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see Subsections 4.3.1.6 and 4.3.1.7). Therefore the governing transients "NSSS Design Transients" are those identified in the HNP steam generator replacement/uprating analysis. The list of design transients used in these fatigue analyses is shown in Table 4.3-1. Forty-year design Cumulative Usage Factor (CUF) values were compiled from design documents including the recent HNP steam generator replacement/uprating analysis. These design fatigue usage factors are presented in Table 4.3-2.

The next step in the explicit evaluation was to gather and review plant design information, actual plant transient data from the RCS and other sources and archived RCS operational parametric data. This information was used to develop actual operational transients experienced from June 4, 1985 to October 18, 2004. This data was gleaned from the HNP Cycle and Transient Monitoring Program records, input from plant personnel, and historical data obtained from the HNP Plant Information System.

Using the actual plant transients developed, the next step was to determine 60-year cycle projections. The projected numbers of cycles for 60 years of operation were established by using the average rate of occurrence based on the transient cycle counts to-date (18 years) and projecting them for 60 years of operations. The resulting 60-year projections were then compared to the number of design cycles for each transient to determine the adequacy of the current fatigue analyses based upon the 40-year cycles.

Additional analyses were required for several "partial cycle" transients. This was to account for transients of much less severity than design, so that the less severe transients would not be counted as full design cycles. The ANSI B31.1 Power Piping Code, 1967 Edition, Section 102.3.2, provides the following equation and methodology for mathematically determining the number of equivalent full temperature range changes that result from the number of lesser temperature range changes:

$$N = N_E + r_1^5 N_1 + r_2^5 N_2 + \ldots r_n^5 N_n$$

Where: N = the number of equivalent full temperature cycles,
N_E = number of cycles at full temperature change for which expansion stress has been calculated,
$N_{1,} N_2 \ldots N_n$ = number of cycles at lesser temperature changes,
$r_{1,} r_2 \ldots r_n$ = ratio of lesser temperature cycles to the cycle for which the expansion stress has been calculated.

For this evaluation, the partial range cycles were converted to the equivalent number of full severity cycles, and the totals were adjusted accordingly. Using this approach, the results showed a considerable reduction in the number of equivalent full temperature range cycles.

Through use of this approach, HNP was able to demonstrate the original design fatigue calculations remained valid through the period of extended operation for all analyzed components except the following sub-components of the Steam Generators and the Pressurizer:

- Steam Generator Secondary Manway Bolts
- Steam Generator 4 in. Inspection Port Bolts
- Pressurizer Surge Line
- Pressurizer (portions of the lower head)

The next step in the HNP approach was to re-analyze the above components using plant-specific data and/or by removing unnecessary conservatisms. The re-analyses of the above components resulted in 60-year fatigue usages which remained within the ASME Code allowable value of 1.0. The analyses for these components are discussed further in Subsections 4.3.1.5, 4.3.1.6, and 4.3.1.7.

The final step in the HNP evaluation was to factor the effects of the reactor water environment on fatigue. The environmental fatigue evaluation is addressed below.

The HNP evaluation of NSSS components was used to demonstrate compliance with 10 CFR 54.21(c)(1) by using a combination of methods (i), (ii), and (iii). Since the 60-year transient cycle projections were used in determining that the design fatigue analyses remain valid for 60 years, the HNP Fatigue Monitoring Program must continue to be used to validate the assumptions used in the evaluations. Therefore, the analyses in Sections 4.3.1.1 through 4.3.1.4 include 10 CFR 54.21(c) method (iii) in addition to methods (i) and/or (ii).

The following sections provide a summary of the evaluation results for each of the major NSSS components evaluated.

4.3.1.1 Reactor Vessel

Summary Description

TLAAs have been identified for several sub-components of the Reactor Vessel. As stated above, the use of transients provided by the HNP steam generator replacement/ uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see Subsections 4.3.1.6 and 4.3.1.7). Therefore the NSSS Design Transients are those identified in the HNP steam generator replacement/ uprating analysis. Refer to Table 4.3-1. Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The reactor vessel fatigue analysis demonstrated that if the reactor vessel components were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60 year operating term. For the components that are part of the Reactor Vessel, the highest 60-year design fatigue usage value is 0.37 for the closure studs. This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation; and**
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.2 Reactor Vessel Internals

Summary Description

A TLAA has been identified for the Reactor Vessel Internals. The NSSS Design Transients are identified in the HNP steam generator replacement/uprating analysis (see Table 4.3-1). Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The Reactor Vessel Internals fatigue analysis demonstrated that if the Reactor Vessel Internals were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60 year operating term. For the Reactor Vessel Internals, the 60-year design fatigue usage value is 0.52 for the core internals. This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Disposition: 10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.3 Control Rod Drive Mechanism

Summary Description

TLAAs have been identified for several sub-components of the Control Rod Drive Mechanism (CRDM). The NSSS Design Transients are identified in the HNP steam generator replacement/uprating analysis (see Table 4.3-1). Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The CRDM fatigue analysis demonstrated that if the CRDM were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60 year operating term. For the CRDM, the highest 60-year design fatigue usage value is 0.99 for the "Lower Joint Canopy Area" (see Table 4.3-2). This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Disposition: 10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.4 Reactor Coolant Pumps

Summary Description

The Reactor Coolant Pumps (RCPs) have been designed and analyzed to meet the ASME Code of record. The original design fatigue analysis was performed using fatigue waiver requirements. The pumps were therefore identified as having a TLAA. The RCP fatigue analysis demonstrated that if the RCPs were exposed to a bounding set of postulated transient cycles, the fatigue waiver would remain valid.

Analysis

The current design fatigue analysis for the HNP RCPs was performed using the ASME Code [NB-3222.4(d)] waiver of fatigue requirements. Therefore, it was unnecessary to determine a 40-year or 60-year fatigue usage factor for the Reactor Coolant Pumps. Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the fatigue waiver remains valid for 60 years of operations.

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation; and**
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.5 Steam Generators

Summary Description

TLAAs have been identified for several sub-components of the Steam Generators. As stated above, the use of transients provided by the HNP steam generator replacement/ uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see Subsections 4.3.1.6 and 4.3.1.7). Therefore the NSSS Design Transients are those identified in the HNP steam generator replacement/ uprating analysis (see Table 4.3-1). Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The Steam Generator fatigue analysis demonstrated that if the Steam Generator subcomponents were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0 with the exception of the Secondary Manway Bolts and the 4 in. Inspection Port Bolts. These components are discussed in more detail below.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the 60-year projected cycles, the current design basis fatigue usage values do not exceed the design limit of 1.0 and are acceptable for all original design evaluations except for the following components:

- Steam Generator Secondary Manway Bolts
- Steam Generator 4 in. Inspection Port Bolts

The Steam Generator Secondary Manway Bolts and 4 in. Inspection Port Bolts were identified as having 60-year design fatigue usage factors over 1.0. The current design fatigue usage factors were also over 1.0, however, these components were identified "to be replaced based on a replacement schedule". Management of the aging effect in this manner would have been acceptable as allowed by 10 CFR 54.21(c)(1) method (iii). However, HNP re-analyzed the Steam Generator Secondary Manway Cover Bolts and 4 in. Inspection Port Bolts to remove unnecessary conservatisms. The updated evaluation changed only the number of Unit Loading and Unit Unloading transient cycles relative to the previous design analysis. Each transient was conservatively considered to occur 2000 times over the life of the plant, a number which is still greater than the best estimate number provided in the previous design analysis.

Fatigue usage for the bolts based on the reduced Unit Loading and Unit Unloading cycles are as follows:

- Secondary Manway Cover Bolts: Fatigue Usage = 0.83
- 4 in. Inspection Port Bolts: Fatigue Usage = 0.81

Since the fatigue usages for the above bolts do not exceed 1.0, they are acceptable for the number of cycles postulated in the analysis, (i.e. design allowable cycles for all transients except for the Unit Loading and Unit Unloading transients with 2000 cycles each). Therefore, these components were deemed acceptable through the period of extended operation by use of 10 CFR 54.21(c)(1) method (ii) and method (iii).

For the remaining components that are part of the Steam Generators, the highest 60-year design fatigue usage value is 0.98 for the "Minor Shell Taps" (see Table 4.3-2). This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation;**
10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.6 Pressurizer

Summary Description

TLAAs have been identified for several sub-components of the Pressurizer. As stated above, the use of transients provided by the HNP steam generator replacement/ uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see below and Subsection 4.3.1.7). Therefore the NSSS Design Transients are those identified in the HNP steam generator replacement/uprating analysis (see Table 4.3-1). Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The Pressurizer fatigue analysis demonstrated that if the Pressurizer subcomponents were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0 for all components. However, certain locations of the Pressurizer lower head are not bounded by the original design fatigue analysis, because the original fatigue analysis did not consider insurge/outsurge transients that were identified subsequent to the original fatigue analysis.

Therefore, the pressurizer lower head locations were re-analyzed for 60-year transients considering plant-specific cyclic data. For the applicable Pressurizer components, 10 CFR 54.21(c)(1) method (ii) was employed by performance of a separate fatigue analysis.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projected cycles, the current design basis fatigue usage values do not exceed the design limit of 1.0 for all components of the pressurizer with the highest value being 1.00 for the Trunnion Bolt Hole. Therefore, the 60-Year Design Fatigue Usage values for the pressurizer components are acceptable for all original design evaluations except for portions of the lower pressurizer head.

Recommendations of the Westinghouse Owners Group (WOG) were used to address operational pressurizer insurge/outsurge transients. These include reviewing plant operating records in sufficient detail to determine pressurizer insurge/outsurge transients for past operation, updating pressurizer lower head and surge nozzle transients to reflect past and projected future operations, and evaluating the impact of the updated transients on the structural integrity of the pressurizer. The WOG also recommended operating strategies that may be used in the future to address the insurge/outsurge issue. On January 20, 1994, HNP adopted the Modified Operating Procedures recommended by the WOG to mitigate pressurizer insurge/outsurge transients.

Plant data from hot functional testing to January 20, 1994 was used to establish pre-Modified Operating Procedures transients that represent past plant heat-up and cooldown operations. For post-Modified Operating Procedures operations, the plant data from July 19, 1999 to October 18, 2004 was collected and was processed. These 5.26 years of data histories, in conjunction with the pre-Modified Operating Procedures transients, were projected and used to predict 60 year fatigue usage based on maintaining current operating practices.

Fatigue evaluations of the pressurizer lower head and surge line nozzle were performed using the online monitoring and Westinghouse proprietary design analysis features of the WESTEMS™ Integrated Diagnostics and Monitoring System. The fatigue evaluations follow the procedures of ASME Code, Section III, NB-3200. The stress ranges, cycle pairing and fatigue usage factors were calculated using WESTEMS™, consistent with the ASME Code and WOG recommendations.

The 60-year fatigue evaluations were performed at critical locations of the pressurizer lower head (including the pressurizer surge nozzle) and of the surge line RCS hot leg nozzle. The evaluations were based upon pre-Modified Operating Procedures transients in conjunction with the post- Modified Operating Procedures transients that include the effects of insurge/outsurge and surge line stratification. These transients were developed based upon plant-specific data and the information and guidelines provided by the WOG. The predicted 60-year fatigue usage was determined assuming that future operations would follow current operating procedures (i.e., the 5.26 year sample period is representative of past and future post-Modified Operating Procedures operations).

The ASME Section III fatigue requirements were shown to be met for the controlling locations evaluated for the 60 years of operation with similar operating practices. For the 60 years of plant life, the pressurizer lower head has the highest fatigue usage of 0.24 at the inside surface of the lower head at the heater penetration region. This is well within the Code allowable of 1.0. Therefore, it is concluded that the fatigue requirements are satisfied for the 60 years of operation.

Based on the above, the portions of the pressurizer lower head not bounded by the original analysis were evaluated using 10 CFR 54.21(c)(1) methods (ii) and (iii). For the remaining components that are part of the Pressurizer, the highest 60-year design fatigue usage value is 1.00 for the "Trunnion Bolt Hole". This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations. These remaining components were evaluated using 10 CFR 54.21(c)(1) methods (i) and (iii).

Disposition: 10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation;
10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.1.7 Reactor Coolant Pressure Boundary Piping (ASME Class 1)

Summary Description

TLAAs have been identified for components of the Reactor Coolant Pressure Boundary (RCPB) Piping. As stated above, the use of transients provided by the HNP steam generator replacement/ uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see below and Subsection 4.3.1.6). Therefore the NSSS Design Transients are those identified in the HNP steam generator replacement/uprating analysis (see Table 4.3-1). Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis (see Table 4.3-2). The RCPB Piping fatigue analysis demonstrated that, if the RCPB piping components were exposed to a bounding set of postulated transient cycles, the CUF values for the components do not exceed 1.0. However, the Pressurizer Surge Line is not bounded by the original design fatigue analysis.

In response to NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification, HNP evaluated the pressurizer surge line stratification transients separately for 40 years of operations. The 60-year projected cycles could not be shown simply to be bounded by the 40-year transients for the pressurizer surge line. Therefore, the surge line was re-analyzed for 60-year transients considering the effects of thermal stratification and plant-specific cyclic data. For the Pressurizer Surge Line, 10 CFR 54.21(c)(1) method (ii) was employed by performance of a separate fatigue analysis to analyze the Pressurizer Surge Line for 60-year transients. For this 60-year evaluation, a separate fatigue analysis was performed to address the surge line transients considering the effects of thermal stratification and plant-specific cyclic data.

Analysis

Using the general approach described in 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations except for the Pressurizer Surge Line which is not considered bounded by the original analysis. For the components that are part of the RCPB Piping, the highest 60-year design fatigue usage value is 0.98 for the Pressurizer Spray Piping (see Table 4.3-2). Therefore, the 60-Year

Design Fatigue Usage values for the RCPB Piping components are acceptable for all original design evaluations except for the Pressurizer Surge Line. The Pressurizer Surge Line was evaluated with the Pressurizer Lower Head as described in 4.3.1.6 and determined to be acceptable.

Based on the analysis described in 4.3.1.6, the pressurizer surge line was evaluated using 10 CFR 54.21(c)(1) methods (ii) and (iii). The remaining components that are part of the RCPB Piping were evaluated using 10 CFR 54.21(c)(1) methods (i) and (iii).

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation;**
10 CFR 54.21(c)(1)(ii) – The analyses have been projected to the end of the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.2 IMPLICIT FATIGUE ANALYSIS (ASME CLASS 2, CLASS 3, AND ANSI B31.1 PIPING)

The subject ASME Class 2, Class 3 and ANSI B31.1 piping within the scope of this review is identified in FSAR Table 3.2.1-1. This section discusses piping components that did not require an explicit design fatigue analysis.

4.3.2.1 ASME Class 2 and 3 Piping

Summary Description

HNP auxiliary piping that was designed to ASME Section III, Code Class 2 and 3 requirements did not require an explicit fatigue evaluation. Instead, for Class 2 and 3 piping, the Code includes implicit treatment of fatigue using a stress range reduction factor, f, which is a function of the total number of thermal expansion stress range cycles. The factor is equal to 1.0 for up to 7,000 cycles. For greater number of cycles, f may be further reduced, thereby reducing the thermal expansion range stress allowable. The HNP fatigue evaluation for Class 2 and 3 piping shows the original design evaluations for the Class 2 and 3 components remain valid for 60 years.

Analysis

It is reasonable to conclude that most Class 2 and 3 components, which are connected to the Class 1 piping, are subject to the same thermal cycles associated with RCS operation as the Class 1 piping. Therefore, for a given Class 2 or 3 piping system, the applicable transient cycles may be estimated by summing the individual transients counted for the adjacent Class 1 piping system. If this number of cycles is less than

7,000, the full stress range reduction factor of 1.0 would apply, and the components could operate for the 60-year period without exceeding the design allowable stresses.

Since the 60-year projected numbers of thermal cycles for the Class 1 RCS components have been shown to be less than the 40-year design cycles, it is also reasonable to conclude that the number of thermal cycles expected to occur in 60 years for the Class 2 and 3 components will be less than originally postulated during the design process.

Based on the above, the original design evaluations for the Class 2 and 3 components remain valid for 60 years.

Since this evaluation is based upon the 60-year transient cycle projections for the Class 1 RCS components, the HNP Fatigue Monitoring Program must continue to be used to validate the assumptions used in the evaluations. Therefore, this analysis includes 10 CFR 54.21(c) method (iii) in addition to method (i).

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation;**
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.2.2 ANSI B31.1 Piping

Summary Description

In addition to ASME Class 2 and Class 3 piping, the scope of License Renewal at HNP includes non-safety related piping designed to ANSI B31.1. HNP auxiliary piping that was designed to ANSI B31.1 requirements did not require an explicit fatigue evaluation. Instead, for ANSI B31.1 piping, the "Power Piping" Code includes implicit treatment of fatigue using a stress allowable reduction factor, f, which is a function of the total number of thermal expansion stress range cycles. The factor is equal to 1.0 for up to 7,000 cycles. For greater number of cycles, f may be further reduced, thereby reducing the thermal expansion range stress allowable.

Analysis

This analysis addresses ANSI B31.1 piping that was designed for systems with operating cycles corresponding to Class 1 design cycles. Piping that was designed for cyclic loading that may not correspond to Class 1 design cycles is evaluated separately. Therefore, for piping that was designed for cycles corresponding to ASME Section III, Class 1 design cycles, it is reasonable to conclude that the subject ANSI B31.1 piping are subject to the same thermal cycles associated with RCS operation as the Class 1 piping. Therefore, for a given ANSI B31.1 piping system, the applicable transient cycles may be estimated by summing the individual transients counted for the adjacent Class 1 piping system. If this number of cycles is less than 7,000, the full stress range reduction factor of 1.0 would apply, and the components could operate for the 60-year period without exceeding the design allowable stresses.

Since the 60-year projected numbers of thermal cycles for the Class 1 RCS components have been shown to be less than the 40-year design cycles, it is also reasonable to conclude that the number of thermal cycles expected to occur in 60 years for the ANSI B31.1 piping components will be less than originally postulated during the design process. Therefore, based upon the 60-year projected number of cycles for Class 1 components, the original design evaluations for the ANSI B31.1 piping, for systems with operating cycles corresponding to Class 1 design cycles, components remain valid for 60 years.

Since this evaluation is based upon the 60-year transient cycle projections for the Class RCS components, the HNP Fatigue Monitoring Program must continue to be used to validate the assumptions used in the evaluations. Therefore, this analysis includes 10 CFR 54.21(c) method (iii) in addition to method (i).

Disposition: **10 CFR 54.21(c)(1)(i)- The analyses remain valid for the period of extended operation;**
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.3.3 ENVIRONMENTALLY-ASSISTED FATIGUE ANALYSIS

The effects of reactor water environment on fatigue were evaluated for a subset of representative components. The representative components selected were based upon the evaluations in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Design Curves to Selected Nuclear Power Plant Components." Since HNP Class 1 piping was designed in the more recent history of Westinghouse plant design, the locations corresponding to the "Westinghouse Newer Vintage Plant" were selected. The representative components evaluated are as follows:

- Reactor Vessel Shell and Lower Head
- Reactor Vessel Inlet and Outlet Nozzles
- Pressurizer Surge Line
- Charging Nozzle
- Safety Injection Nozzle
- Residual Heat Removal (RHR) System Class 1 Piping

In addition to the above representative NUREG/CR-6260 locations, locations in the pressurizer lower head that are potentially subject to insurge/outsurge (I/O) transients were also evaluated considering reactor water environmental effects.

The methods used to evaluate environmental effects on fatigue were based on NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low Alloy Steels," NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," and NUREG/CR-6717, "Environmental Effects of Fatigue Crack Initiation in Piping and Pressure Vessel Steels." Environmental fatigue life correction factors (F_{en}) were used to obtain adjusted cumulative fatigue usage (U_{en}) which includes the effects of reactor water environments.

Environmentally-adjusted 60-year cumulative fatigue usage factors (U_{en}) values remained within the ASME Code allowable value of 1.0 and are therefore considered acceptable. Adjusted cumulative usage values (U_{en}) are summarized in Table 4.3-3.

4.3.4 RCS LOOP PIPING LEAK-BEFORE-BREAK ANALYSIS

Summary Description

In accordance with the CLB, a Leak-Before-Break (LBB) analysis was performed to show that any potential leaks that develop in the Reactor Coolant System (RCS) loop piping can be detected by plant leak monitoring systems before a postulated crack causing the leak would grow to unstable proportions during the 40-year plant life. LBB evaluations postulate a surface flaw at a limiting stress location, and demonstrate that a through-wall crack will not result following exposure to a lifetime of design transients. A separate evaluation assumes a through-wall crack of sufficient size, such that the resultant leakage can be easily detected by the existing leakage monitoring system, and then demonstrates that, even under maximum faulted loads, this crack is much smaller (with margin) than a critical flaw size that could grow to pipe failure. The aging effects to be addressed during the period of extended operation include thermal aging of the primary loop piping components and fatigue crack growth.

Analysis

WCAP-14549-P, Addendum 1,0 "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Harris Nuclear Plant for the License Renewal Program," is a new LBB calculation applicable to HNP large bore RCS piping and components that includes allowances for reduction of fracture toughness of cast austenitic stainless steel due to thermal embrittlement during a 60-year operating period. This calculation concluded:

1. Stress corrosion cracking is precluded by use of fracture resistant materials in the piping system and controls on reactor coolant chemistry, temperature, pressure, and flow during normal operation. Currently, an EPRI Material Reliability Program is underway to address the Alloy 82/182 Primary Water Stress Corrosion Cracking issue for the industry due to the V. C. Summer cracking incident. However, calculations for Alloy 82/182 locations were performed, and this material is not bounding.

2. Water hammer should not occur in the RCS piping because of system design, testing, and operational considerations.

3. The effects of low and high cycle fatigue on the integrity of the primary piping are negligible. The fatigue crack growth evaluated is insignificant.

4. A margin of 10 exists between the leak rate of small stable leakage flaws and the capability (1 gpm) of the HNP RCS pressure boundary Leakage Detection System.

5. A margin of two or more exists between the small stable leakage flaw sizes of and the larger critical stable flaws.

6. Ample margin exists in stability using the 60 year, end of life thermal aging material properties.

The new analysis meets the requirements for LBB required by 10 CFR 50, Appendix A, General Design Criterion 4, and uses the recommendations and criteria from the NRC Standard Review Plan for LBB evaluations.

Therefore, the RCS primary loop piping LBB analysis has been projected to the end of the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(ii) – The RCS loop LBB analyses have been projected to the end of the period of extended operation.

4.3.5 CYCLIC LOADS THAT DO NOT RELATE TO RCS TRANSIENTS

This section contains components that are listed as involving thermal fatigue TLAAs where the number of thermal cycles that may not correspond to Class 1 components transient cycles. These components were originally designed in accordance with ASME Section III, Class 2 or Class 3 or ANSI B31.1, Power Piping Code, which requires implicit fatigue analyses using stress range reduction factors instead of explicit cumulative usage factor (CUF) values. These design codes account for cyclic loading by reducing the allowable stress for the component if the number of anticipated cycles exceeds certain limits. It requires the designer to determine the overall number of anticipated thermal cycles for the component and apply stress range reduction factors if this number exceeds 7,000. This implicit fatigue analysis method effectively reduces the allowable stress for the component, which keeps the applied loads below the endurance limit for the material.

The basic strategy in the following subsections considers the number of transient cycles postulated for 40 years, the License Renewal evaluation determines if the number of cycles for 60 years would require a reduction in stress beyond that originally applied during the original design process. These assessments can be made by comparing the design cycles projected to occur in 60 years against the 7,000 cycle criterion for a stress range reduction factor. If the total number of cycles projected for 60 years does not exceed 7,000, then the original design considerations remain valid.

4.3.5.1 Primary Sample Lines

Summary Description

In accordance with HNP FSAR Table 3.2.2-1, the portion of the Primary Sampling System equipment that are in the scope of this TLAA are the "System Piping and Valves" that are "a) Part of the RCPB" and "b) Normally or automatically isolated from the RCPB." The scope of piping for part a) is the portion of piping that is upstream of the piping anchor for the outboard isolation valves for penetrations M-78A, B, and C. These portions are essentially the safety related piping component in the system and a small portion of the non-safety related tubing up to the first anchor. The portion of piping under part b) that is downstream of the anchor on the non-safety related tubing is not considered relevant to the licensee in making safety determinations.

There are three sample line penetrations involved - RCS Hot Legs (M-78A), Pressurizer Liquid Space (M-78B), and Pressurizer Steam Space (M-78C). The following analyses determined the number of cycles to which the relevant equipment would be subjected and compared them to the implicit fatigue analysis acceptance criterion of 7,000 cycles. The applied cycles are based on the manner in which the equipment is used.

Analyses

<u>Penetration M-78A - RCS Hot Legs</u>

The piping downstream of M-78A include three parallel branch lines that supply the Post Accident Sample Panel in the Post Accident Sampling System (PASS), the Primary Sample Panel in the Reactor Coolant Sample System and the Gross Failed Fuel Detector in the Gross Failed Fuel Detection System. The Gross Failed Fuel Detector is in continuous operation during reactor startup, operation and shutdown and the base load follows the reactor thermal cycles. However, as a result of this configuration, the safety related portion of the reactor coolant sample lines has the potential to experience additional thermal cycles whenever flow through the detector is interrupted. This would occur when the containment isolation valves are closed, when flow is swapped between RCS Hot Leg 2 and Hot Leg 3, and when flow to the letdown line and Volume Control Tank and Boron Thermal Regeneration System is isolated. The cyclic operation of the Primary Sample Panel has no effect on the thermal cycles experienced by the flow through penetration M-78A due to the continuous flow through the Gross Failed Fuel Detector. Interruption of flow through the detector from downstream equipment would require isolation of the letdown line and Volume Control Tank and the Boron Thermal Regeneration System. The possibility of this latter event happening is very rare, and this occurrence is considered a negligible contributor to the number of cycles.

Based on this discussion, the total number of cycles experienced by the RCS Hot Leg Sample lines can be estimated by adding to the number of RCS thermal cycles, the number of times the hot leg is swapped and the number of cycles caused by penetration M-78A isolations of sufficient duration to permit cool-down of the sample lines. For the purposes of this evaluation, a penetration isolation lasting for more than 10 minutes while the RCS Hot Leg temperature exceeds 500°F is conservatively considered one thermal cycle.

Currently RCS flow is swapped between Hot Legs 2 and 3 on an approximate monthly schedule. Even though this results in six cycles on each supply from the hot legs, this evaluation conservatively considers this to be twelve cycles each year and simplifies the evaluation. Over 60 years of operation and ignoring shutdown this results in 720 cycles. Based on uncertainty in the early operating practice of the plant, this number has been rounded up to 1,000 cycles.

The number of cycles due to reactor shutdowns and the number of penetration M-78A isolations that would result in a thermal cycle were estimated based on a review of plant data over a period of approximately 6.75 years. During this time period there were 9 cycles due to reactor shutdowns and 22 thermal cycles due to penetration isolation valve closure. Applying a ratio of 60 years over 6.75 years yields 8.88. This value was rounded up to 9 and used to multiply 9 shutdown cycles and 22 penetration isolation cycles. This process yielded the following 60-year projections:

81 reactor thermal cycles, and
198 thermal cycles due to penetration isolations.

Therefore, the total number of hot leg thermal cycles for penetration M-78A is 1,279 cycles, which is less than the requisite 7,000 cycles.

<u>Penetration M-78B - Pressurizer Liquid Space</u>

The Pressurizer liquid space is sampled weekly per HNP Environmental and Chemistry Sampling and Analysis Program. This penetration supplies the primary sample panel and is cycled every time it is used to sample the Pressurizer liquid. The number of cycles was estimated by multiplying 52 cycles per year times 60 years resulting in 3120 thermal cycles. Because this line is connected to the Pressurizer, the estimated number of reactor thermal cycles over 60 years (81 cycles - see penetration M-78A) was added to 3120 cycles. This results in 3201 thermal cycles, which is less than the requisite 7,000 cycles.

Penetration M-78C - Pressurizer Steam Space

The sample line associated with the Pressurizer steam space penetration (M-78C) is normally used during degassing for reactor shutdown conditions and also for sampling following a postulated accident. A portion of the sample line is exposed to steam from the Pressurizer. Every time condensate is removed, the line has an opportunity to heat up again. It is assumed that the condensate will be drained at least once an RCS cycle during testing of the isolation valves. Consequently, the number of thermal cycles for the sample lines will be equal to the number of RCS (Class 1 piping) cycles. The number of cycles estimated to occur is approximately 81 cycles, which is less than the requisite 7,000 cycles.

Since the total number of thermal cycles for the sample lines is less than 7,000 cycles, no reanalysis of the piping design calculations is necessary. Therefore, an evaluation was performed as required by 10 CFR 54.21(c)(1) and was successful in demonstrating under 10 CFR 54.21(c)(1) (i) that the reactor coolant sample line design analyses of record remain valid for the period of extended operation (60 years).

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses of qualification for Primary Sample Lines remain valid for the period of extended operation.

4.3.5.2 Steam Generator Blowdown Lines

Summary Description

The portion of the Steam Generator Blowdown lines included in this TLAA are listed in FSAR Table 3.2.1-1 as the portion of the system designed to ASME Section III, Class 2 and ANSI B31.1 codes. This FSAR table identifies these components as "a) the system piping and valves from the steam generator to and including outboard containment isolation valves," and "b) from containment isolation valves to RAB Wall" and "Other." Components in the turbine building may also be designed to ANSI B31.1 as noted in the "Other" listing, but these components do not have any bearing on equipment within the scope of license renewal.

Blowdown flow is normally maintained during operation in order to maintain Steam Generator water chemistry. A thermal cycle in the Blowdown lines may result whenever Blowdown flow to the flash tank is interrupted. There are many potential reasons for interruption of Blowdown flow during periods of operation. For example, Blowdown flow would be interrupted due to an Auxiliary Feedwater Pump actuation signal, a safety injection signal, high condenser hotwell level signal, Steam Generator Flash Tank Hi-Hi level, containment isolation or other testing purposes. These interruptions have the potential to result in thermal cycles over and above the heat-up and cooldown cycles of the reactor.

Analyses

The method of estimating the number of cycles is to review data over a recent time period and count the number of cycles that the Blowdown flow at HNP was interrupted. The resulting number of cycles will be multiplied by a ratio based on years to estimate the total number of cycles that could be expected over 60 years of operation. The potential to undercount comes from the assumption that the number of cycles over the period counted is representative of the past operation and will be representative of future operation. Additionally, no partial cooldown cycles are counted. To offset the potential to undercount, a conservative counting criterion is adopted and the total number of cycles will be extrapolated to 60 years and 100 years.

The conservative method chosen adopted the criterion that one cycle will be counted when Blowdown flow is interrupted for more than 30 minutes. For the purposes of thermal fatigue, a complete thermal cycle is defined as a heat up from ambient to operating temperature followed by a cooled down to ambient temperature. The criterion adopted for counting thermal cycles is conservative because it includes interruptions of Blowdown flow in which a significant decrease in temperature is <u>not</u> expected. This is based on the operating practice for reestablishing Blowdown flow following a Blowdown isolation valve closure. This operating practice states that if the isolation valves are closed for more than 30 minutes the downstream piping must be warmed-up prior to opening the isolation valves. It follows then that if an isolation valve is closed for less than 30 minutes this does not constitute a significant cooldown period.

The number of cycles due to reactor shutdowns is included in the Blowdown cycles counted. Based on a review of plant data over a period of approximately 5.5 years, the number Blowdown flow interruptions that would result in a thermal cycle were estimated to be 37 cycles. Applying a ratio based on 60 years and 100 years results in 404 cycles and 673 cycles, respectively. Since the total number of thermal cycles for the Steam Generator Blowdown lines is less than 7,000 cycles, no reanalysis of the piping design calculations is necessary. Therefore, an evaluation was performed as required by 10 CFR 54.21(c)(1) and was successful in demonstrating under 10 CFR 54.21(c)(1) (i) that the Steam Generator Blowdown Line design analyses of record remain valid for the period of extended operation (60 years).

Disposition: **10 CFR 54.21(c)(1)(i) – The analyses of qualification for the Steam Generator Blowdown Lines in the scope of License Renewal remain valid for the period of extended operation.**

TABLE 4.3-1 NSSS TRANSIENT CYCLE PROJECTIONS FOR 60-YEAR OPERATION

Transient Classification	No.	Transient Name	Design Cycles	Cycles To-Date (18 Years)	60 Year Projected Cycles
Normal Condition					
	1	Plant Heatup	200	40	133
	2	Plant Cooldown	200	40	133
	3	Unit Loading at 5%/Min from 15% to 100% Power	18,300	535	1783
	4	Unit Unloading at 5%/Min from 100% to 15% Power	18,300	444	1480
	5	Step Load Increase of 10% of Full Power	2,000	0	0
	6	Step Load Decrease of 10% of Full Power	2,000	13	43
	7	Large Step Load Decrease	200	6	20
	8	Steady State Fluctuations (Initial)	1.50E+05	0	0
	9	Steady State Fluctuations (Random)	3.00E+06	0	0
	10	Feedwater Cycling at Hot Standby	2,000	100	1500
	11	Unit Loading from 0% to 15% Power	500	0	0
	12	Unit Loading from 15% to 0% Power	500	0	0
	13	Loop Out of Service Shutdown	80	0	0
	14	Loop Out of Service Startup	70	0	0
	15	Boron Concentration Equalization	26,400	0	0
	16	Turbine Roll Test	80	0	0
	17	Refueling	80	24	80
Upset Condition					
	1	Loss of Load	200	0	0
	2	Loss of Power	40	1	3
	3	Partial Loss of Flow	80	2	7
	4	Reactor Trip Case A No Cooldown	230	44	147
	5	Reactor Trip Case B Cooldown, No SI	160	7	23
	6	Reactor Trip Case C Cooldown with SI	10	2	7
	7	Inadvertent RCS Depressurization	20	1	3
	8	Inadvertent Startup of an Inactive Loop	10	0	0

Transient Classification	No.	Transient Name	Design Cycles	Cycles To-Date (18 Years)	60 Year Projected Cycles
	9	Control Rod Drop	80	0	0
	10	Inadvertent Safety Injection	60	2	7
	11	Excess Feedwater Flow	30	1	3
	12	RCS Cold Over-pressurization	10	5	10
	13	Operating Basis Earthquake (OBE)	5	0	0
Emergency Condition					
	1	Small LOCA	5	0	0
	2	Small Steam Line Break	5	0	0
	3	Complete Loss of Flow	5	0	0
Faulted Condition					
	1	Large LOCA	1	0	0
	2	Large Steam Line Break	1	0	0
	3	Feedwater Line Break	1	0	0
	4	Reactor Coolant Pump Locked Rotor	1	0	0
	5	Control Rod Ejection	1	0	0
	6	Steam Generator Tube Rupture	6	0	0
	7	Safe Shutdown Earthquake (SSE)	1	0	0
Test Condition					
	1	Primary Side Hydrostatic Test	10	1	3
	2	Secondary Side Hydrostatic Test	10	3	10
	3	Primary Side Leak Test	200	1	3
	4	Secondary Side Leak Test	80	0	0
	5	Steam Generator Tube Leak Test	800	0	0

TABLE 4.3-2 DESIGN FATIGUE USAGE FACTORS

List Number	Component	Location	Fatigue Usage
1	Reactor Vessel	Outlet Nozzles	0.0458
2		Inlet Nozzles	0.0061
3		Closure Head Flange	0.0037
4		Vessel Flange	0.0041
5		Closure Studs	0.3744
6		CRDM Housings	0.0021
7		Vent Pipe	0.0062
8		Bottom Head Juncture	0.0129
9		Bottom Head Instrumentation Tubes	0.0062
10		Main Vessel Shell	0.0052
11		Core Support Pads	0.0221
12		Head Adapter Plug	0.0042
13	Reactor Vessel Internals	Core Internals	0.52
14	CRDMs	Generic Report, Lower Joint Canopy Area	0.4392
15		Lower Joint Canopy Area, ASN 23 Outside Surface	0.9862
16		Lower Joint Head Adapter, ASN 8 Inside Surface	0.3115
17		Lower Joint Latch Housing, ASN 14 Inside	0.1009
18		Middle Joint Latch Housing, ASN 43 Outside Surface	0.0584
19		Middle Joint Rod Travel Housing, ASN 53 Inside Surface	0.0007
20		Middle Joint Canopy Area, ASN 69 Inside Surface	0.1508
21		Upper Joint Rod Travel Housing, ASN 95 Inside Surface	0.0696
22		Upper Joint CRDM Cap, ASN 131 Outside Surface	0.0053
23		Upper Joint Vent Plug, ASN 142 Inside Surface	0.001
24		Upper Joint Canopy Area, ASN 118 Inside Surface	0.0001
25		CLH Latch Housing, ASN 47 Outside Surface	0.1184
26		CLH Cap, ASN 152 Inside Surface	0.7241
27		CLH Vent Plug, ASN 142 Inside Surface	0.0001
28		CLH Canopy Area, ASN 70 Inside Surface	0.1294
29	RCP	RCP	Fatigue waiver
30	Steam Generator	Primary Side Components	0.62
31		Main Feedwater Nozzle	0.93

List Number	Component	Location	Fatigue Usage
32		Auxiliary Feedwater Nozzle	0.16
33		Secondary Manway Opening	0.59
34		Secondary Manway Bolts	1.462 (See Note 1)
35		Hand-Hole	0.525
36		Hand-Hole Bolts	0.804
37		4" Inspection Port	0.728
38		4" Inspection Port Bolts	1.233 (See Note 1)
39		2" Un-Reinforced Inspection Port Opening	0.495
40		2" Un-Reinforced Inspection Port Opening Bolts	0.747
41		Minor Shell Taps	0.9844
42		Tubesheet/Stub Barrel Junction	0.34
43		Upper Shell/Transition Cone/Lower Shell	0.576
44		Spray Nozzles	0.95
45	Pressurizer	Surge Nozzle	0.672 (See Note 2)
46		Spray Nozzle Safe End	0.42
47		Spray Nozzle Body/Shell intersection	0.85
48		Safety and Relief Nozzle	0.064
49		Lower Head	0.909 (See Note 2)
50		Heater Well	0.198 (See Note 2)
51		Upper Shell	0.992
52		Support Skirt/Flange	0.393
53		Support Skirt/Lower Shell	0.143 (See Note 2)
54		Seismic Lug at lug/shell junction	0.37
55		Manway Cover Bolts	0.875
56		Trunnion Bolt Hole	0.995
57		Instrument Nozzle	0.338
58		Immersion Heater/Sheath	0
59		Valve Support Bracket	0.24
60	RCL Piping	Hot Leg	0.9
61		Crossover Leg	0.2
62		Cold Leg	0.4
63	RHR Loop 1 Piping	12" x 8" Trunnion	0.921
64		RCL nozzle	0.1
65	RHR Loop 3 Piping	12" x 1" Branch	0.173

List Number	Component	Location	Fatigue Usage
66		RCL nozzle	0.1
67	Pressurizer Surge Line	RCL nozzle	0.85 (See Note 2)
68	Accumulator Loop 1 Piping	12" Long radius elbow	0.09
69		RCL nozzle	0.45
70	Accumulator Loop 2 Piping	12" Long radius elbow	0.09
71		RCL nozzle	0.45
72	Accumulator Loop 3 Piping	12" Long radius elbow	0.09
73		RCL nozzle	0.45
74	Pressurizer Spray Piping	Lp. 1,2 Cold leg 4" nozzle	0.4
75		Section 5 4" butt weld	0.983
76	Normal Charging Line Piping	Lp. 2 Cold leg 3" nozzle	0.79
77		Section 2 branch	0.92
78	Alternate Charging Line Piping	Lp. 1 Cold leg 3" nozzle	0.85
79		Sec 2 branch	0.92
80	Safety Injection - Cold Leg Lines Loops 1,2,3	Cold leg 6" nozzle	0.7
81		Section 3 2" Socket weld	0.9
82	Safety Injection - Hot Leg Lines Loops 1,2,3	Hot leg 6" nozzle	0.7
83	Safety Injection - Hot Leg Lines Loops 1,2,3	Section 2 6"x2" branch	0.61
84	Normal Letdown Line	Loop 1 Crossover leg 3" nozzle	0.2
85		Section 1 3"x2" reducer	0.53
86	Excess Letdown Line	Loop 3 Crossover leg 3" nozzle	0.4
87		Section 4 2" elbow	0.05
88	Loop Drain Line	Loop 2 Crossover leg 2" nozzle	0.21
89		Section 3 Socket weld to valve	0.82
90	Pressurizer Safety Line	Section 2 6"x3/4" Branch	0.9
91	Pressurizer Relief Line	Section 2 3" Transition weld to valve	0.9

Note 1. Due to the original design usage factors exceeding 1.0, these bolts were originally replaced based on a replacement schedule, however, these fatigue usage values have been superseded by the results of the license renewal fatigue evaluation described in Subsection 4.3.1.5.

Note 2. Fatigue usage shown for these locations is superseded by the results of the license renewal fatigue evaluation described in Subsection 4.3.1.6.

TABLE 4.3-3 60-YEAR ENVIRONMENTALLY-ADJUSTED CUF VALUES

Component	60-year Environmentally Adjusted CUF (U_{en})
Bottom Head Juncture	0.0327
Reactor Vessel Inlet Nozzles	0.0154
Reactor Vessel Outlet Nozzles	0.1160
Surge Line	0.94
Charging Nozzle	0.89
Safety Injection Nozzle	0.93
RHR Class 1 Piping	0.173
Pressurizer (Lower Head at Heater Penetration)	0.5984

4.4 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL EQUIPMENT

Thermal, radiation, and cyclical aging analyses of plant electrical and I&C components required to meet 10 CFR 50.49 have been identified as time-limited aging analyses (TLAAs) for HNP.

The NRC has established nuclear station environmental qualification (EQ) requirements in 10 CFR 50, Appendix A, Criterion 4, and in 10 CFR 50.49. Section 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments (that is, those areas of the plant that could be subject to the harsh environmental effects of a loss-of-coolant accident (LOCA), high energy line breaks (HELBs), or post-LOCA radiation) are qualified to perform their safety function in those harsh environments after the effects of in-service aging. 10 CFR 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

4.4.1 ENVIRONMENTAL QUALIFICATION PROGRAM BACKGROUND

The HNP EQ Program meets the requirements of 10 CFR 50.49 for the applicable electrical components important to safety. 10 CFR 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in-scope components, and requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics and the environmental conditions to which the components could be subjected. Section 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. Section 50.49(e) also requires replacement or refurbishment of components not qualified for the current license term prior to the end of designated life, unless additional life is established through ongoing qualification. Section 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions. Sections 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981; and RG 1.89, Rev. 1, Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants, June 1984. Compliance with 10 CFR 50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of in-service aging.

The HNP EQ Program manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components 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 components in the HNP EQ Program that specify a qualification of at least 40 years are TLAAs for license renewal because all of the criteria contained in 10 CFR 54.3 are met.

Under 10 CFR §54.21(c)(1)(iii), the HNP EQ Program, which implements the requirements of 10 CFR 50.49 (as further defined and clarified by NUREG-0588, and RG 1.89, Rev. 1), is viewed as an aging management program for License Renewal. Reanalysis of an aging evaluation to extend the qualifications of components is performed on a routine basis as part of the HNP EQ Program. Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). TLAA demonstration option (iii), which states that the effects of aging will be adequately managed for the period of extended operation, is chosen and the HNP EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA. Section 4.4.2.1.3 of NUREG-1800 states that the staff evaluated the EQ program (10 CFR 50.49) and determined that it is an acceptable aging management program to address environmental qualification according to 10 CFR 54.21(c)(1)(iii). The evaluation referred to in the SRP-LR contains sections on *EQ Component Reanalysis Attributes* and *Evaluation and Technical Basis*, which is the basis of the description provided below.

4.4.2 EQ COMPONENT REANALYSIS ATTRIBUTES

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of the HNP EQ Program. While a component life-limiting condition may be due to thermal, radiation or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to HNP quality assurance program requirements, which require the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods – The HNP EQ Program uses the same analytical models in the reanalysis of an aging evaluation as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging a similar approach may be used. Other models may be justified on a case-by-case basis.

Data Collection & Reduction Methods – Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis per the HNP EQ Program. Temperature data used in an aging evaluation should be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors. A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as: (a) directly applying the plant temperature data in the evaluation or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis must be justified. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions – HNP EQ Program component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria and Corrective Action – Under the HNP EQ Program, the reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component must be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).

4.4.3 CONCLUSION

The HNP EQ Program has been demonstrated to be capable of programmatically managing the qualified lives of the components falling within the scope of the program for License Renewal. Based on the above review, the continued implementation of the HNP EQ Program provides reasonable assurance that the aging effects will be managed and that EQ components will continue to perform their intended functions for the period of extended operation. This result meets the requirements of 10 CFR

54.21(c)(iii). A comparison of the HNP Environmental Qualification Program to the corresponding program in NUREG-1801 is provided in Appendix B, Subsection B.3.2.

4.5 CONCRETE CONTAINMENT TENDON PRESTRESS

NUREG-1800 assigns TLAA Section 4.5 to the issue of Concrete Containment Tendon Prestress. The containment structures for HNP Units 1 and 2 have no prestressed tendons. Therefore, this section is not applicable.

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4.6 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

4.6.1 CONTAINMENT MECHANICAL PENETRATION BELLOWS FATIGUE

4.6.1.1 Mechanical Penetration Bellows - Valve Chambers

Summary Description

The four mechanical penetration bellows addressed by this section are the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows (2 each) associated with containment penetrations M-47 through M-50. These penetrations are illustrated in FSAR Table 6.2.4-1. Each line is provided with motor-operated gate valves. These valves are enclosed in valve chambers that are leaktight at containment design pressure. Each line from the containment sump to the valve is enclosed in a separate concentric guard pipe which is also leaktight. A seal is provided so that neither the chamber nor the guard pipe is connected directly to the containment sump or to the containment atmosphere.

Per the plant specifications, the valve chamber bellows expansion joint design is in accordance with ASME Section III, Paragraph NC-3649.1 so that no single corrugation is permitted to deflect more than its maximum allowable amount. Each bellows is designed to withstand a total of 7,000 cycles of expansion and compression over a lifetime of 40 years due to maximum normal operating conditions and 10 cycles of movement due to safe shutdown earthquake condition.

This time-limited aging analysis (TLAA) addresses the requirement to ensure that the lifetime as described above may be extended to 60 years without exceeding the design criterion of 7,000 cycles of expansion and compression. The 10 cycles of movement due to safe shutdown earthquake are still available, since an earthquake of the magnitude of the safe shutdown earthquake has not been experienced.

Analyses

Operating cycles of expansion and compression due to maximum normal operating conditions are conservatively calculated by adding the design cycles corresponding to the Reactor Coolant System (Class 1) corresponding to heat-up and cool-down of the containment plus the number of times the containment is pressurized during Type A Integrated Leak Rate Testing (ILRT) plus the number times a Type B local leak rate test (LLRT) is performed.

The expansion bellows is the barrier between the valve chamber and the Reactor Auxiliary Building. The containment isolation valves (CIV) associated with these chambers isolate the containment sumps from the Containment Spray System and Residual Heat Removal (RHR) System and therefore do not normally experience any fluid flow. Operation of RHR during cool-down of the RCS would have a negligible impact on the bellows due to the piping configuration but are included since operation of RHR would typically correspond to the Reactor Coolant System (Class 1) cycles.

The number of Reactor Thermal Cycles projected over 60 years is 81 cycles. The containment ILRT is performed infrequently, i.e., once every 10 years. Conservatively assuming an ILRT will be performed once every 5 years rather than the maximum period of 10 years yields 12 cycles. Per Type B Local Leak Rate Test program the maximum test interval for this equipment is 24 months. Since this is the maximum interval, the minimum will be conservatively assumed to be yearly resulting in an additional 60 cycles. The total number of cycles anticipated for 60 years is:

$$81 + 12 + 60 = 153 \text{ cycles.}$$

Since the total number of thermal cycles for the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows is less than 7,000 cycles, no reanalysis of the design calculations is necessary. Therefore, an evaluation was performed as required by 10 CFR 54.21(c)(1) and was successful in demonstrating under 10 CFR 54.21(c)(1)(i) that the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows design analyses of record remain valid for the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses of qualification for the valve chamber expansion bellows remain valid for the period of extended operation.

4.6.1.2 Mechanical Penetration Bellows - Fuel Transfer Tube Bellows Expansion Joint

Summary Description

The Fuel Transfer Tube is essentially a tubular passageway connecting the transfer canal in the containment building with the one in the spent fuel pit building. Per plant specifications, the Fuel Transfer Tube bellows-expansion-joint design shall be in accordance with ASME Section III, Paragraph NC-3649.1, and such that no single corrugation is permitted to deflect more than its maximum allowable amount. Each bellows shall be designed to withstand a total of 7,000 cycles of expansion and compression over a lifetime of 40 years due to maximum normal operating conditions and 10 cycles of movement due to safe shutdown earthquake condition.

This TLAA addresses the requirement to ensure that the lifetime as described above may be extended to 60 years without exceeding the design criterion of 7,000 cycles of expansion and compression. The 10 cycles of movement due to safe shutdown earthquake are still available as an earthquake of the magnitude of the safe shutdown earthquake has not been experienced.

Analyses

The expansion cycles would occur when the tube is flooded between the transfer canal in the Containment Building and the Fuel Handling Building. This operation typically occurs twice every refueling outage. Therefore, the maximum number of operating cycles projected to be experienced over a 60 year period is:

60 years x 1 refueling per 1.5 years x 2 cycles per refueling = 80 cycles.

Since the total number of thermal cycles for the Fuel Transfer Tube Bellows Expansion Joint is less than 7,000 cycles, no reanalysis of the design calculations is necessary. Therefore, an evaluation was performed as required by 10 CFR 54.21(c)(1) and was successful in demonstrating that the Fuel Transfer Tube Bellows Expansion Joint design analyses of record remain valid for the period of extended operation (60 years).

Disposition: **10 CFR 54.21(c)(1)(i) – The analyses of qualification for Fuel Transfer Tube Bellows Expansion Joint remain valid for the period of extended operation.**

4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

4.7.1 TURBINE ROTOR MISSILE GENERATION ANALYSIS

Summary Description

According to General Design Criterion 4, nuclear power plant structures, systems, and components important to safety shall be appropriately protected against dynamic effects, including the effects of missiles. Failures of large steam turbines of the main turbine generator have the potential for ejecting large high-energy missiles that can damage plant structures, systems, and components. The overall safety objective is to ensure that structures, systems, and components important to safety are adequately protected from potential turbine missiles.

RG 1.115 describes methods acceptable to the NRC staff for protecting safety related structures, systems, and components against low-trajectory missiles resulting from turbine failure by appropriate orientation and placement of the turbine generator set. HNP complies with RG 1.115, Revision 1 with the exception of Position C.2.

FSAR Section 3.5.1.3.2, Probability of Turbine Missile Generation, describes a study based upon fracture mechanics that was performed by Westinghouse to obtain a rough estimate of turbine-generator reliability based on expected operating conditions. The number of cycles required to cause an existing crack (flaw) to grow to some larger size was determined. The number of cold start-up cycles (worst case stress environment) required by the maximum size undetectable flaw to grow to 1/3 of the critical crack size was calculated to be 140,000. A reasonable upper limit for the number of this type of stress cycle was estimated to be 5 per year or 200 per 40 years plant life. Thus, the maximum undetectable crack poses no threat to the integrity of a turbine-generator possessing the design mechanical properties.

Analyses

The original analysis estimated 5 cycles per year for 40 years of plant operation. To incorporate the period of extended operation, the estimate of 5 cycles per year will be used for 60 years of plant operation. This yields 300 cycles for 60 years of plant life. The 300 estimated cycles are well below the 140,000 cycles required by the maximum size undetectable flaw to grow to 1/3 of the critical crack size. Therefore, this analysis is projected to the end of the period of extended operation.

Disposition **10 CFR 54.21(c)(1)(ii) –This turbine rotor fracture mechanics analysis of the number of turbine start-up cycles that could result in critical flaw size is projected to the end of the period of extended operation.**

4.7.2 CRANE CYCLIC ANALYSES

Summary Description

The load cycle limits for cranes was identified as a potential TLAA. The following HNP cranes are in the scope of License renewal and have been identified as having a TLAA, which requires evaluation for 60 years.

- Polar Crane
- Jib Cranes
- Reactor Cavity Manipulator Crane
- Fuel Cask Handling Crane
- Fuel Handling Bridge Crane
- Fuel Handling Building Auxiliary Crane

The method of review applicable to the crane cyclic load limit TLAA involves:
(1) reviewing the existing 40-year design basis to determine the number of load cycles considered in the design of each of the cranes in the scope of License Renewal, and
(2) developing 60-year projections for load cycles for each of the cranes in the scope of License Renewal and compare with the number of design cycles for 40 years.

Analyses

4.7.2.1 Polar Crane

The overhead crane in the Containment (250-Ton / 50-Ton) used for reactor servicing operations is of the polar configuration and is seated on a girder bracketed off the Containment wall.

The HNP Polar Crane purchasing specification required that the crane conform to Crane Manufacturer's Association of America (CMAA), Specification 70, 1971 edition, for Electric Overhead Traveling Cranes. The purchasing specification did not state a service classification but the crane meets the Service Class A requirement. The crane was therefore designed for 20,000 to 100,000 maximum rated load cycles for 40-year life.

The number of maximum rated load cycles for the 250 Ton (Main Hook) originally projected for 40 years was 2,720. The number of maximum rated cycles for 60-year life based on 40 refueling outages is 4,020. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable.

The number of maximum rated load cycles for the 50 Ton (Auxiliary Hook) originally projected for 40 years was 1,080. The number of maximum rated cycles for 60-year life based on 40 refueling outages is 1,600. This is below the 20,000 to 100,000 permissible cycles and is therefore acceptable.

The Polar Crane Main Hook and Auxiliary Hook ultimately share the same structure and therefore their cycles should be combined as follows: 4020+1,600 = 5,620 cycles. This is below the 20,000 – 100,000 permissible cycle range and is therefore acceptable.

Therefore, the Polar Crane fatigue analysis has been successfully projected for 60-years of plant operation.

4.7.2.2 Jib Cranes

The two Containment Jib Cranes (5-Ton) are used to support low-load capacity refueling and maintenance activities and have the flexibility to be mounted on any one of six base plates. This provides relief and increases the availability for the ever-critical path Polar Crane.

The Jib Crane purchasing specification required that the crane conform to CMAA, Specification 74, for Under Running Single Girder Electric Overhead Traveling Cranes, Service Class A1 (Standby). The crane was therefore designed for 20,000 to 100,000 maximum rated load cycles for 40-year life.

The number of maximum rated load cycles originally projected for 40 years was 12,690. Based on 40 refueling outages, the number of maximum rated load cycles projected for 60-year life is 18,800. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable. Therefore, the Jib Crane fatigue analysis has been successfully projected for 60-years of plant operation.

4.7.2.3 Reactor Cavity Manipulator Crane

The rectilinear bridge and trolley crane with a vertical mast extending down into the refueling water provides the flexibility to grip, remove, and replace fuel assemblies to support refueling operations. Only the passive bridge structure is within the scope of License Renewal and is manufactured from carbon steel.

The Reactor Cavity Manipulator Crane purchasing specification required that the maximum design stress for the crane structure shall be 1/5 of Ultimate Tensile Strength. The low maximum design stress for the crane structure indicates the stress is marginally below the fatigue limit for the carbon steel material and therefore the carbon steel is estimated to be acceptable for 10^7 cycles. Therefore, the number of lifts for 40-years is estimated to be 10^7 cycles.

The number of load cycles originally projected for 40 years was 11,390. Based on 40 refueling outages, the number of maximum rated load cycles projected for 60-year life is 16,824. This is less than the 10^7 permissible cycles and is therefore acceptable. Therefore, the Reactor Cavity Manipulator Crane fatigue analysis has been successfully projected for 60-years of plant operation.

4.7.2.4 Fuel Cask Handling Crane

The Fuel Cask Handling Crane (150-Ton) transfers the spent fuel cask between the railroad car and the spent fuel cask loading pool. The Fuel Cask Handling Crane and the Fuel Handling Auxiliary Crane share the same rails that are supported from the Fuel Handling Building in the overhead.

The Fuel Cask Handling Crane purchasing specification required that the crane conform to CMAA, Specification 70, for Electric Overhead Traveling Cranes. The purchasing specification did not state a service classification but the crane meets the Service Class A requirement. The crane was therefore designed for 20,000 to 100,000 maximum rated load cycles for 40-year life.

The number of load cycles originally projected for 40 years was 7,350. Based on 40 refueling outages, the number of load cycles projected for 60-year life is 8,750. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable. Therefore, the Fuel Cask Handling Crane fatigue analysis has been successfully projected for 60-years of plant operation.

4.7.2.5 Fuel Handling Bridge Crane

The Fuel Handling Bridge Crane (1.25-Ton) is a wheel-mounted walkway spanning the width of the Fuel Handling Building. The crane carries an electric monorail hoist on an overhead structure.

The Fuel Handling Bridge Crane purchasing specification required that the maximum design stress for all load bearing parts, design load plus structural weight, shall be 1/5 ultimate strength of the material. The Westinghouse specification did not specify a permissible number of cycles for the lifetime of the crane nor a service class. Material of construction for this crane conforms to ASTM A-36 specification. The low maximum design stress for the carbon steel crane structure above the refueling water elevation indicates the stress is marginally below the fatigue limit for the carbon steel material and therefore the carbon steel is estimated to be acceptable for 10^7 cycles. Therefore, the acceptable number of maximum rated load cycles for 40-years or 60 years was estimated to be 10^7 cycles.

The number of load cycles originally projected for 40 years was 18,602 based on crane usage for the original HNP fuel load, fuel movements during 27 refueling outages, usage for fuel and fuel insert shuffles, and movement of spent fuel from other Progress Energy facilities. The number of load cycles projected for 60 years is 27,558 assuming 40 refueling outages and projected crane use for the previously listed activities. The projected number of cycles for 60 years is less than the 10^7 permissible cycles and is, therefore, acceptable. Based on this evaluation, the Fuel Handling Bridge Crane fatigue analysis has been successfully projected for 60-years of plant operation.

4.7.2.6 Fuel Handling Building Auxiliary Crane

The Fuel Handling Building Auxiliary Crane (12-Ton) is used to support the refueling process. The Fuel Handling Building Auxiliary Crane and the Fuel Cask Handling Crane share the same rails that are supported from the Fuel Handling Building in the overhead.

The Fuel Handling Building Auxiliary Crane purchasing specification required that the crane conform to CMAA, Specification 70, for Electric Overhead Traveling Cranes. The purchasing specification did not state a service classification but the crane meets the Service Class A requirement. The crane was therefore designed for 20,000 to 100,000 maximum rated load cycles for 40-year life.

The number of load cycles originally projected for 40 years is 12,280. Based on 40 refueling outages, the number of load cycles projected for 60-year life is 15,380. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable. Therefore, the Fuel Handling Building Auxiliary Crane fatigue analysis has been successfully projected for 60-years of plant operation.

Disposition: 10 CFR 54.21(c)(1)(ii) – Based on the above information, the analyses associated with the Polar Crane, Jib Cranes, and Reactor Cavity Manipulator Crane in the Containment Building, and the Fuel Cask Handling Crane, Fuel Handling Bridge Crane, and Fuel Handling Building Auxiliary Crane in the Fuel Handling Building have been projected to the end of the period of extended operation.

4.7.3 MAIN AND AUXILIARY RESERVOIR SEDIMENTATION ANALYSES

Summary Description

The Auxiliary Reservoir functions as the ultimate heat sink for HNP, and the Main Reservoir functions as a backup in case the Auxiliary Reservoir is not available. The HNP FSAR states that, for the length of the plant life of 40 years, the volume of potential sediment in the Auxiliary Reservoir amounted to 0.4 percent of the reservoir capacity at the normal water level and the volume of potential sediment in the Main Reservoir amounted to 0.7 percent of the reservoir capacity at the normal water level. The FSAR concludes that the effects of sediment deposit on the reservoir operations and cooling capacities will be negligible for the current 40-year operating license. Based on the discussion in the FSAR, sedimentation in the Main and Auxiliary Reservoirs at HNP was considered to be a TLAA, since the sedimentation effects are based on a 40-year plant life.

During the original licensing review of HNP, a commitment was made to use RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, to monitor the effects of sedimentation on water control structures. The RG 1.127 inspections include monitoring the sedimentation in the Main and Auxiliary Reservoirs which could reduce the reservoir capacities at their normal water levels. In addition, the HNP Technical Specifications require a daily check for minimum water level in the Main and Auxiliary Reservoirs, for the ultimate heat sink to be operable.

Analyses

For the extended life of 60 years, the effects of sediment are expected to also be negligible, based on the impact of increased vegetation, paving, and control of storm runoff by catch basins and storm drains at the plant island. In addition a simple calculation of sedimentation based on the ratio of 60 years to 40 years projects values that would have a negligible effect on the capability of the reservoirs. However, HNP intends to use a monitoring program to address this TLAA. The HNP Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Aging Management Program, monitors the Main and Auxiliary Reservoir shoreline, reservoirs, and drainage area for landslides, excessive sedimentation, or developments in the drainage basin that could cause a sudden increase in sediment load, which would reduce the reservoir capacity. The frequency of the inspection of the Auxiliary and Main Reservoirs is every five years. Inspection results to date have not identified excessive sedimentation or changes leading to excessive sedimentation that could cause a sudden increase in sediment load. Therefore, the continued implementation of the HNP RG 1.127 Program, will manage the effects of sedimentation in the Main and Auxiliary Reservoirs during the period of extended operation.

Disposition: **10 CFR 54.21(c)(1)(iii) – The effects of ongoing sedimentation on the intended function(s) of the Main and Auxiliary Reservoirs will be adequately managed for the period of extended operation.**

4.7.4 HIGH ENERGY LINE BREAK LOCATION POSTULATION BASED ON FATIGUE CUMULATIVE USAGE FACTOR

Summary Description

Section 3.6 of the HNP FSAR describes the design bases and measures that are taken to demonstrate that the systems, components and structures required to safely shutdown and maintain the reactor in a cold shutdown condition are adequately protected against the effects of blowdown jets, reactive forces, and pipe whip resulting from postulated rupture of piping both inside and outside Containment.

Cumulative Usage Factors have been used in determining the break locations of high energy Class 1 piping systems, excluding the Reactor Coolant System main loop piping. Guidance from RG 1.46, "Protection Against Pipe Whip Inside Containment," and from

NRC Branch Technical Position MEB 3-1, "Postulated Break and Leakage Locations in Fluid System Piping Outside Containment," was used. FSAR Section 3.6.2.1.1.2 states:

> Regulatory Guide 1.46 has been followed in all matters except for the postulation of break points. The criteria of MEB 3-1 for Class 1 piping has been adapted such that pipe breaks are postulated to occur at:
>
> a) terminal ends.
> b) intermediate locations where the maximum stress range as calculated by Eq. (10) and either (12) or (13) exceeds 2.4 Sm.
> c) intermediate locations where the cumulative usage factor exceeds 0.1.

The calculation of cumulative usage factors used design cycles associated with a 40-year design life. Since the design cycles used in these evaluations are associated with a 40-year design life, the high-energy line-break postulation based on cumulative usage factor is considered a TLAA.

Analysis

As discussed in Subsection 4.3.1, original fatigue design calculations assumed a large number of design transients, corresponding to relatively severe system dynamics over the original 40-year design life. Using the general approach described in Subsection 4.3.1, 60-year fatigue cycle projections have been made for License Renewal. Based on the 60-year cycle projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current cumulative usage factors used for the postulation of break locations in Class 1 lines may be used for the 60-year operating term.

Disposition: 10 CFR 54.21(c)(1)(i) – The analyses remain valid for the period of extended operation; and
10 CFR 54.21(c)(1)(iii) – The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

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APPENDIX A

FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

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A.0 FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

This appendix provides the information to be submitted in a Final Safety Analysis Report Supplement as required by 10 CFR 54.21(d) for the HNP License Renewal Application. The License Renewal Application contains the technical information required by 10 CFR 54.21(a) and (c). Chapter 3 of the HNP License Renewal Application identifies the programs and activities that manage the effects of aging for the proposed period of extended operation, and Appendix B describes the programs and activities. Chapter 4 contains the evaluations of time-limited aging analyses for the period of extended operation. License Renewal Application Chapters 3 and 4 and Appendix B have been used to prepare the program and activity descriptions that are contained in this Appendix. The information presented here will be incorporated into the HNP FSAR following issuance of the renewed operating license.

A.1 NEW FSAR SECTION

The following information will be integrated into the FSAR to document aging management programs and activities credited in the HNP License Renewal review and time-limited aging analyses evaluated to demonstrate acceptability during the period of extended operation.

A.1.1 AGING MANAGEMENT PROGRAMS AND ACTIVITIES

The integrated plant assessment and evaluation of time-limited aging analyses (TLAA) identified existing and new 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. This section describes the programs and their implementation activities and identifies those programs that have been determined to be consistent with NUREG-1801, "Generic Aging Lessons Learned (GALL)," Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, (NUREG-1801).

Three elements common to all aging management programs are corrective actions, confirmation process, and administrative controls. These elements are included in the HNP Quality Assurance (QA) Program, which implements the requirements of 10 CFR 50, Appendix B.

In accordance with the guidance of NUREG-1801, regarding aging management of reactor vessel internals components for aging mechanisms, such as embrittlement and void swelling, HNP will: (1) participate in the industry programs for investigating and managing aging effects on reactor internals (such as Westinghouse Owner's Group and Electric Power Research Institute materials programs), (2) evaluate and implement the results of the industry programs as applicable to the reactor internals, and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

In accordance with the guidance of NUREG-1801, regarding activities for managing the aging of nickel alloy and nickel-clad components susceptible to primary water stress corrosion cracking, HNP will comply with applicable NRC Orders and will implement: (1) applicable Bulletins and Generic letters, and (2) staff-accepted industry guidelines.

Upon issuance of the renewed license, guidance will be incorporated into administrative control procedures that manage the HNP configuration control process to ensure that the requirements of 10 CFR 54.37(b) are met.

A.1.1.1 ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program

The American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program is an existing program that consists of periodic volumetric, surface, and/or visual examinations of components for assessment, signs of degradation, and corrective actions. The Program for the Second 10-Year interval at HNP is implemented in accordance with Section XI of the ASME B&PV Code, 1989 Edition (no addenda).

A.1.1.2 Water Chemistry Program

To mitigate aging effects on component surfaces that are exposed to water as a process fluid, chemistry programs are used to control water chemistry for impurities (e.g., dissolved oxygen, chloride, fluoride, and sulfate) that accelerate corrosion and cracking. The HNP Water Chemistry Program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below the system-specific limits. Alternatively, chemical agents, such as corrosion inhibitors, oxygen scavengers, and biocides, may be introduced to prevent certain aging mechanisms. The HNP Water Chemistry Program is currently based on the latest version of the Electric Power Research Institute (EPRI) pressurized water reactor guidelines, "Pressurized Water Reactor Primary Water Chemistry Guidelines: Volume 1 and 2, Revision 5," and "Pressurized Water Reactor Secondary Water Chemistry Guidelines – Revision 6." The HNP Water Chemistry Program will be updated as revisions to the guidelines are released. The HNP Water Chemistry Program is an existing program and is consistent with the corresponding program described in NUREG-1801.

A.1.1.3 Reactor Head Closure Studs Program

The HNP Reactor Head Closure Studs Program is an existing condition monitoring program which is implemented primarily through the HNP ASME Section XI Inservice Inspection Program. In addition, the program includes certain preventive measures recommended by Regulatory Guide 1.65, "Material and Inspection for Reactor Vessel Closure Studs." This program is credited for aging management of the Reactor Vessel Closure Head Stud Assembly (Closure Studs and Closure Nuts) for cracking due to stress corrosion cracking and loss of material due to wear.

A.1.1.4 Boric Acid Corrosion Program

The Boric Acid Corrosion Program manages the aging effects for susceptible materials of structures and components that perform a License Renewal intended function and that are exposed to the effects of borated water leaks. The program consists of:
(1) visual inspection of external surfaces that are potentially exposed to borated water leakage, (2) timely discovery of leak path and removal of the boric acid residues,

(3) assessment of the damage, and (4) follow-up inspection for adequacy of corrective actions. This program is implemented in response to NRC Generic Letter 88-05.

The scope of the Boric Acid Corrosion Program includes components that may be susceptible to exposure to boric acid including mechanical, structural, and electrical components. The Boric Acid Corrosion Program includes plant-specific reactor coolant pressure boundary (RCPB) boric acid leakage identification and inspection procedures to ensure that leaking borated coolant does not lead to degradation of the leakage source or adjacent structures, and provides assurance that the RCPB will continue to perform its intended functions consistent with the CLB for the period of extended operation. The Boric Acid Corrosion Program is an existing program and is consistent with the corresponding program described in NUREG-1801.

A.1.1.5 Nickel-alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure heads of Pressurized Water Reactors

The HNP Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is an existing program that provides for the periodic inspection of the Reactor Pressure Vessel head and Vessel Head Penetration nozzles. This program effectively manages cracking in the Vessel Head Penetration (VHP) nozzles by identifying cracking in the upper penetration nozzles or the J-groove welds prior to loss of intended function. The required inspections are performed in the HNP ISI Program as augmented inspections.

Prior to the period of extended operation, the ISI Program administrative controls will be enhanced to specifically identify the requirements of NRC Order EA-03-009. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.6 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program

The HNP Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program that will manage loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement of CASS reactor vessel internals. This program will performed as augmented inspections to visual inspections already required by the ASME Code. Components within the scope of this Program include CASS reactor vessel internals components that have been determined to be potentially susceptible to thermal aging and/or are subjected to neutron fluence of greater than 10^{17} n/cm^2 (E>1 MeV). This program is consistent with the corresponding program described in NUREG-1801.

A.1.1.7 Flow-Accelerated Corrosion Program

The Flow-Accelerated Corrosion (FAC) Program is an existing program that provides for prediction, inspection, and monitoring of piping, valves, and fittings for a loss of material due to FAC so that timely and appropriate action may be taken to minimize the probability of experiencing a FAC-induced consequential leak or rupture. The FAC Program elements are based on the recommendations identified in NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program", which require controls to assure the structural integrity of carbon steel lines containing high-energy fluids (two phase as well as single phase). The HNP FAC Program manages loss of material in carbon steel piping and fittings.

Prior to the period of extended operation, the HNP FAC Program will be enhanced to provide a consolidated exclusion bases document (i.e., a FAC susceptibility analysis). The exclusion bases document will include an evaluation of the Steam Generator Feedwater Nozzles to determine their susceptibility to FAC. Following enhancement, the Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.8 Bolting Integrity Program

The Bolting Integrity Program addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The HNP Bolting Integrity Program utilizes industry recommendations and EPRI guidance that considers material properties, joint/gasket design, chemical control, service requirements, and industry and site operating experience in specifying torque and closure requirements. The program relies on recommendations for a Bolting Integrity Program, as delineated in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and industry recommendations, as delineated in EPRI reports NP-5769, "Degradation and Failure of Bolting in Nuclear Power Plants," and TR-104213, "Bolted Joint Maintenance & Applications Guide," for pressure retaining bolting within the scope of License Renewal. Bolting and closures inspections, monitoring and trending, and repair and replacement are performed under ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD Program and External Surfaces Monitoring Program requirements, as applicable. Degraded conditions are also subject to the Corrective Action Program. The Structures Monitoring Program and the ASME Section XI Inservice Inspection, Subsection IWF Program are credited for aging management of structural bolting.

Prior to the period of extended operation a precautionary note will be added to plant bolting guidelines to prohibit the use of molybdenum disulfide lubricants.

A.1.1.9 Steam Generator Tube Integrity Program

The Steam Generator Tube Integrity Program is credited for aging management of the tubes, tube plugs, tube supports, and the secondary-side components whose failure could prevent the steam generator from fulfilling its intended safety function for the period of extended operation. The Steam Generator Tube Integrity Program is based on an existing program, the Steam Generator Integrity Program, that has been established to meet the intent of the Steam Generator Program guidance in Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines," Revision 2. The Steam Generator Integrity Program is based on Technical Specification requirements and NEI 97-06.

Prior to the period of extended operation the Program implementing procedure will be enhanced to include a description of the instructions for implementing corrective actions if tube plugs or secondary-side components (e.g., tube supports) are found to be degraded.

A.1.1.10 Open-Cycle Cooling Water System Program

The Open-Cycle Cooling Water System Program addresses the aging effects of material loss, flow blockage, and reduction in heat transfer due to micro- or macro-organisms and various corrosion mechanisms in raw water piping systems. This Program was originally developed in response to NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The Program includes monitoring, inspecting, and testing to verify to verify the safety related portion of the service water systems can perform their intended functions. The Program provides assurance that aging effects for the Open-Cycle Cooling Water System can be managed during the period of extended operation. The Open-Cycle Cooling Water System Program is an existing program that is consistent with the corresponding program described in NUREG-1801.

A.1.1.11 Closed-Cycle Cooling Water System Program

The Closed-Cycle Cooling Water System Program is an existing program that addresses aging management of components in the Component Cooling Water and Essential Services Chilled Water Systems and components in other systems cooled by these systems. This Program also manages the jacket water components associated with the Emergency Diesel Generators, Diesel Driven Fire Pump, and Security Diesel. These systems are closed cooling loops with controlled chemistry, consistent with the NUREG-1801 description of a closed cycle cooling water system. These systems employ an effective chemistry program augmented by component testing and inspection based on "Closed Cooling Water Chemistry Guideline: Revision 1 to TR-107396, Closed Cooling Water Chemistry Guideline," EPRI, Palo Alto, CA: 2004, 1007820 to assure the License Renewal intended function(s) are maintained.

A.1.1.12 Boraflex Monitoring Program

The Boraflex Monitoring Program is implemented to assure that no unexpected degradation of the Boraflex neutron absorbing material would compromise the criticality analysis for spent fuel storage racks. The criticality analysis for Pressurized Water Reactor spent fuel racks contained in pools A and B currently reflects a zero Boraflex credit. HNP plans to perform new criticality analysis to eliminate credit for Boraflex in the Boiling Water Reactor (BWR) spent fuel racks. Until such time as this analysis has been completed and approved by the NRC, the Boraflex Monitoring Program will continue to be implemented. The Boraflex Monitoring Program is an existing program that relies on periodic inspection, testing and analysis of test coupons and monitoring of silicon levels to assure that the required 5% subcriticality margin is maintained.

Unless an approved analysis exists that eliminates credit for the Boraflex in the BWR fuel racks, prior to the period of extended operation, the Program will be enhanced to: (1) include measurements of actual boron areal density using in-situ techniques, (2) include neutron attenuation testing ("blackness testing"), to determine gap formation in Boraflex panels, and (3) include the use of the EPRI RACKLIFE predictive code or its equivalent. Following enhancement, the Boraflex Monitoring Program will be consistent with the corresponding program described in NUREG 1801.

A.1.1.13 Inspection of Overhead Heavy Load and Light Load Handling Systems Program

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program manages the aging effects of corrosion of structural components and wear of crane rails for the Containment Building Polar Crane, Jib Cranes, Reactor Cavity Manipulator Crane and the Fuel Cask Handling Crane, Fuel Handling Building Auxiliary Crane, and the Fuel Handling Bridge Crane. The Program is an existing program that provides for the periodic inspection of rails and structural members for degradation.

Administrative controls for the Program will be enhanced, prior to the period of extended operation to: (1) include in the Program all cranes that are within the scope of License Renewal; (2) require the responsible engineer to be notified of unsatisfactory crane inspection results; (3) specify an annual inspection frequency for the Fuel Cask Handling Crane, Fuel Handling Bridge Crane, and Fuel handling Building Auxiliary Crane, and every refuel cycle for the Polar Crane, Jib Cranes, and Reactor Cavity Manipulator Crane, and (4) include requirements to inspect for bent or damaged members, loose bolts/components, broken welds, abnormal wear of rails, and corrosion (other than minor surface corrosion) of steel members and connections. The enhanced Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.14 Fire Protection Program

The HNP Fire Protection Program is an existing program that provides aging management of the diesel-driven fire pump fuel oil supply line and credited fire barrier assemblies including fire doors, penetration seals, fire wrap, barrier walls, barrier ceilings and floors, and seismic joint filler. The HNP Fire Protection Program is an effective program that will adequately manage cracking and loss of material so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

Prior to the period of extended operation, the program will be enhanced to: (1) include inspection criteria as described in NUREG-1801 for penetration seals, (2) provide specific procedural guidance for inspecting fire barrier walls, ceilings and floors, (3) include a visual inspection of the diesel-driven fire pump fuel oil supply piping for signs of leakage, and (4) include minimum qualification requirements for inspectors performing inspections required by this Program. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.15 Fire Water System Program

The Fire Water System Program is an existing program that includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable NFPA commitments, and periodic visual inspection of overall system condition. These activities provide an effective means to determine whether corrosion and biofouling are occurring. Inspections of the sprinkler heads assure that corrosion products that could block flow are not accumulating. These measures will allow timely corrective action in the event of system degradation to ensure the capability of the water-based Fire Suppression System to perform its intended functions.

Prior to the period of extended operation, the Program will be revised to: (1) perform non-intrusive baseline pipe thickness measurements at various locations prior to expiration of the current license with subsequent trending of measurements through the period of extended operation at intervals to be determined by engineering evaluation performed after each inspection, and (2) either replace the sprinkler heads prior to reaching their 50-year service life or revise site procedures to perform field service testing, by a recognized testing laboratory, of representative samples from one or more sample areas. Following enhancement, the Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.16 Fuel Oil Chemistry Program

The Fuel Oil Chemistry Program is an existing program that maintains fuel oil quality by monitoring and controlling fuel oil contamination in accordance with the guidelines of the American Society for Testing Materials (ASTM) Standards specified in the HNP

Technical Specifications Surveillance Requirements and chemistry program procedures for fuel oil testing. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by verifying the quality of new oil before its introduction into the storage tanks. Continued quality levels are assured by periodically checking for and removing water from tank drains, sampling to confirm that the bulk properties of water and sediment, particulates contamination, and biological growth are within administrative target values or Technical Specification limits. The effectiveness of the program is verified using visual inspections of system tanks to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.

Prior to the period of extended operation the program administrative controls will be enhanced to: (1) add requirements to enter an item into the corrective action program whenever an administrative value or control limit for parameters relevant to this program are exceeded or water is drained from a fuel oil tank in the scope of this program; (2) establish administrative values for fuel oil chemistry parameters relating to corrosion; (3) require Diesel Fuel Oil System chemistry controls to include semiannual monitoring and trending of water and sediment and particulates from an appropriate sample point for the day tanks and semiannual monitoring and trending of biological growth in the main storage tanks; (4) require Security Power System fuel oil chemistry controls to include semiannual monitoring and trending of biological growth in the fuel oil in the buried storage tank and periodic inspecting of the internal surfaces of the buried storage tank and the aboveground day tank or require UT or other NDE of the tanks if inspection proves inadequate or indeterminate; (5) require Site Fire Protection System fuel oil chemistry controls for the Diesel Driven Fire Pump fuel oil storage tank to include quarterly monitoring and trending of particulates and semiannual monitoring and trending of biological growth, to check and remove water quarterly, to periodically inspect the tank or require UT or other NDE of the tank if inspection proves inadequate or indeterminate; and to revise chemistry sampling procedures to address positive results for biological growth including as one option the use of biocides; and (6) verify the condition of the Diesel Fuel Oil Storage Tank Building Tank Liners by means of bottom thickness measurements under the One Time Inspection Program.

A.1.1.17 Reactor Vessel Surveillance Program

The Reactor Vessel Surveillance Program is an existing program that manages the reduction of fracture toughness of the reactor vessel beltline materials due to neutron embrittlement. The Program fulfills the intent and scope of 10 CFR 50, Appendix H. The Program evaluates neutron embrittlement by projecting upper shelf energy for all reactor materials with projected neutron exposure greater than 10^{17} n/cm^2 (E > 1.0 MeV) after 60 years of operation and by the development of pressure-temperature limit curves. Embrittlement information is obtained in accordance with NRC Regulatory Guide 1.99, Rev. 2, chemistry tables and through the use of surveillance capsules. The surveillance program design, capsule withdrawal schedule, and evaluation of test results are in accordance with ASTM E 185-82.

Prior to the period of extended operation, the program will be enhanced to: (1) include a provision that tested and untested specimens from all capsules pulled from the reactor vessel must be kept in storage to permit future reconstitution use, and that the identity, traceability, and recovery of the capsule specimens shall be maintained throughout testing and storage, (2) include a provision that withdrawal of the next capsule will occur during Refueling Outage (RFO)-16, which is the outage immediately following the operating cycle in which the capsule fluence is equivalent to the 60-year maximum vessel fluence, (3) include a provision that the analysis of the capsule withdrawn during RFO-16 will be used to evaluate neutron exposure for the capsules remaining in the reactor vessel after RFO-16, so that the neutron exposure and withdrawal schedule for the remaining capsules will be optimized to provide meaningful metallurgical data for the monitoring of neutron exposure if additional license renewals are sought, and (4) include a provision that, if future plant operations exceed the limitations or bounds in Section 1.3 of NRC Regulatory Guide 1.99, Revision 2, or the applicable bounds, e.g., cold leg operating temperature and neutron fluence, as applied to the surveillance capsules, the impact of these plant operation changes on the extent of reactor vessel embrittlement will be evaluated, and the NRC will be notified. Following enhancement, the Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.18 One-Time Inspection Program

The One-Time Inspection Program uses one-time inspections to verify the effectiveness of other aging management programs or to confirm the slow progression or the absence of an aging effect. The program scope includes Water Chemistry Program, Fuel Oil Chemistry Program and Lubrication Analysis Program verifications specified by NUREG-1801, as well as plant specific inspections. The One-Time Inspection Program will be completed by the addition of procedural controls for implementation and tracking. The One-Time Inspection Program is a new program that is consistent with the corresponding program described in NUREG-1801.

A.1.1.19 Selective Leaching of Materials Program

The Selective Leaching of Materials Program includes one-time inspections and qualitative determinations of selected components that may be susceptible to selective leaching. A sample population of susceptible components will be selected for the inspections prior to commencing the period of extended operation. The inspections will determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function(s) for the period of extended operation. This new Program includes an exception to the corresponding program described in NUREG-1801 involving the use of qualitative determinations, other than Brinell hardness testing, to identify the presence of selective leaching.

A.1.1.20 Buried Piping and Tanks Inspection Program

The Buried Piping and Tanks Inspection Program manages the aging effect of loss of material for the external surfaces of buried piping components in HNP systems within the scope of License Renewal. There are no buried tanks in this program. The program includes preventive measures to mitigate corrosion by protecting the external surface of buried piping components through use of coating or wrapping. The program includes visual examination of buried piping components made accessible by excavation. Program requirements based on NUREG-1801 guidance include: (1) incorporate a requirement to ensure an appropriate as-found pipe coating and material condition inspection is performed whenever buried piping within the scope of this Program is exposed, with a minimum frequency of at least one buried piping inspection each 10 years, (2) verify that there is at least one opportunistic or focused inspection performed within the 10-year period prior to the period of extended operation, (3) specify that an inspection checklist will be developed, (4) require inspection results to be documented, (5) add precautions concerning excavation and use of backfill to the excavation procedure with precautions for License Renewal piping, (6) add a requirement that buried pipe coating inspection shall be performed, when excavated, by qualified personnel to assess its condition, and (7) add a requirement that a coating engineer or other qualified individual should assist in evaluation of any pipe coating damage and/or degradation found during the inspection. This new Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.21 One-Time Inspection of ASME Code Class 1 Small-Bore Piping

The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program is a new program that will manage cracking in small-bore (less than NPS 4) Class 1 piping through the use of a combination of volumetric examinations and visual inspections. The program will manage the aging effect through the identification and evaluation of cracking in small-bore Class 1 piping with the exception that volumetric examinations for small-bore socket-welds will not be done. In lieu of performing volumetric inspections of socket welds, the program will include one-time volumetric examinations of a sample of Class 1 butt welds for pipe less than NPS 4. Any cracking identified in small-bore Class 1 piping resulting from stress corrosion or thermal and mechanical loading will result in periodic inspections. The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will be implemented and inspections completed and evaluated prior to the period of extended operation. The Program will effectively manage the aging effect by identifying and evaluating cracking in small-bore Class 1 piping prior to loss of intended function.

A.1.1.22 External Surfaces Monitoring Program

The External Surfaces Monitoring Program is an existing program based on system inspections and walkdowns. The Program consists of periodic visual inspections of components such as piping, piping components, ducting, and other equipment within the scope of License Renewal and subject to aging management review in order to manage aging effects.

Prior to the period of extended operation, the program will be enhanced to: (1) include a specific list of systems managed by the program for License Renewal, (2) provide specific guidance for insulated/jacketed pipe and piping components to identify signs of leakage and provide criteria for determining whether the insulation/jacket should be removed to inspect for corrosion, (3) provide inspection criteria for components not readily accessible during plant operations or refueling outages, (4) provide specific guidance for visual inspections of elastomers for cracking, chafing, or changes in material properties due to wear, and (5) incorporate a checklist for evaluating inspection findings, with qualified dispositions. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.23 Flux Thimble Tube Inspection Program

The Flux Thimble Tube Inspection Program is an existing program that provides for eddy current testing of flux thimble tubes, evaluation of test results, wear prediction, and determination of acceptable inspection frequencies. The program manages loss of flux thimble wall thickness so that timely and appropriate action may be taken so that a through wall leak or rupture of a flux thimble tube does not occur. The Flux Thimble Tube Inspection Program elements are based on the recommendations identified in NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors," and the methodology for predicting wear as identified in WCAP-12866, "Bottom Mounted Instrumentation Flux Thimble Wear."

Prior to the period of extended operation, the HNP Flux Thimble Tube Inspection Program will be enhanced: (1) to require an evaluation of historic plant-specific test data in order to ensure that conservative wear rates are used so that a loss of intended function will not occur, (2) to provide guidance for treatment of flux thimbles that could not be inspected due to restriction, defect or other reason, and (3) to require test results and evaluations be formally documented as QA records. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.24 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program relies upon work order tasks that provide opportunities for the visual inspection of internal surfaces of piping, piping elements, ducting, and components. The Internal Surfaces in Miscellaneous Piping and Ducting Components Program work task activities will monitor parameters that may be detected by visual inspection and include change in material properties, cracking, flow blockage, loss of material and reduction of heat transfer effectiveness. The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program and is consistent with the corresponding program described in NUREG-1801.

A.1.1.25 Lubricating Oil Analysis Program

The Lubricating Oil Analysis Program is an existing program, which maintains lubricating oil quality by periodic sampling for contamination per site program procedures. Exposure to contaminants, such as water and particulates, is minimized by monitoring the lube oil quality and periodic changing of the oil at fixed schedules or when monitored parameters trend toward unacceptable or administrative limits. Lubricating oil analysis of old oil is performed prior to disposal to confirm that water or particulates levels do not indicate a loss of material or reduction in heat transfer is occurring in the system. Effectiveness of the Program is verified under the One-Time Inspection Program prior to the period of extended operation.

Prior to the period of extended operation the program will be enhanced as follows: (1) a review and revision of work documents and analysis requirements will be performed to ensure that the used oil from appropriate component types in the scope of License Renewal is analyzed to determine particle count and moisture, and if oil is not changed in accordance with the manufacturer’s recommendation, then additional analyses for viscosity, neutralization number, and flash point will be performed (this activity will ensure that used oil is visually checked for water); and (2) the program administrative controls will be enhanced to include a requirement to perform ferrography or elemental analysis to identify wear particles or products of corrosion when particle count exceeds an established level or when considered appropriate. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.26 ASME Section XI, Subsection IWE Program

The ASME Section XI, Subsection IWE Program is an existing aging management program used for the aging management of accessible and inaccessible pressure retaining Containment Structure Class MC components. This Program is in accordance with ASME Section XI, Subsection IWE, 1992 Edition, including 1992 Addenda, and in accordance with 10 CFR 50.55a.

Prior to the period of extended operation, the ASME Section XI, Subsection IWE Program implementing procedure will be enhanced to: (1) include additional recordable conditions, (2) include moisture barrier and applicable aging effects, (3) include pressure retaining bolting and aging effects, and (4) include a discussion of augmented examinations.

A.1.1.27 ASME Section XI, Subsection IWL Program

The ASME Section XI, Subsection IWL Program is an existing aging management program used for the aging management of accessible and inaccessible pressure retaining Primary Containment concrete. The HNP containment structure does not use prestressing tendons. Therefore, ASME Section XI, Subsection IWL rules regarding post-tensioning systems are not applicable. This Program is in accordance with ASME Section XI, Subsection IWL, 1992 Edition, including 1992 Addenda, and in accordance with 10 CFR 50.55a.

A.1.1.28 ASME Section XI, Subsection IWF Program

The ASME Section XI, Subsection IWF Program consists of periodic visual examination of component supports for loss of material and loss of mechanical function. The Program is an existing program implemented through plant procedures, which provide for visual examination of ISI Class 1, 2, and 3 supports. The HNP program for component supports, other than snubbers, is in accordance with ASME Section XI, Subsection IWF, 1989 Edition, and in accordance with ASME Code Case N-491-2. For snubber attachments and their fasteners, HNP inspections are provided in accordance with Technical Specifications. The applicable code for the snubber attachments and fasteners is the 1995 Edition, with 1996 Addenda, of the ASME OM Code and ASME OM Code Case OMN-13.

A.1.1.29 10 CFR 50, Appendix J Program

The 10 CFR Part 50, Appendix J Program is an existing program that consists of monitoring of leakage rates through containment liner/welds, penetrations, fittings, and access openings to detect degradation of the pressure boundary. An evaluation is performed and appropriate corrective actions are taken if leakage rates exceed acceptance criteria. For the Integrated Leak Rate Testing, this Program is implemented in accordance with Option B (performance based leak testing) of 10 CFR Part 50, Appendix J; Regulatory Guide 1.163; and NEI 94-01, "Industry Guideline for Implementing Performance Based Option of 10 CFR Part 50, Appendix J." For Local Leak Rate Testing, the Program is in accordance with the prescriptive requirements of 10 CFR Part 50, Appendix J Option A.

Prior to the period of extended operation, the program will be enhanced to describe in the implementing procedures the evaluation and corrective actions to be taken when leakage rates do not meet their specified acceptance criteria. Following enhancement, the Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.30 Masonry Wall Program

The HNP Masonry Wall Program is an existing program designed to manage aging effects of masonry walls. For License Renewal, the Program will assure that the evaluation basis established for each masonry wall within the scope of License Renewal remains valid through the period of extended operation. The program includes masonry walls identified as performing License Renewal intended functions within the Containment Building, Reactor Auxiliary Building, Diesel Generator Building, Fuel Handling Building, HVAC Equipment Room, Security Building, Tank Area/Building (including Unit 1 and Unit 2 buildings), Turbine Building and the Waste Processing Building. The Program is a condition monitoring program with the inspection frequencies established such that no loss of intended function would occur between inspections.

Prior to the period of extended operation, Program administrative controls will be enhanced to identify the structures that have masonry walls in the scope of License Renewal. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.31 Structures Monitoring Program

The Structures Monitoring Program consists of periodic inspection and monitoring of the condition of structures and structure component supports to ensure that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined. This Program an existing program that is implemented in accordance with the Maintenance Rule, 10 CFR 50.65; NEI 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The inspection criteria are based on American Concrete Institute Standard ACI 349.3R-96, "Evaluation of Existing Nuclear Safety-Related Concrete Structures;" and American Society of Civil Engineers, ASCE 11-90, "Guideline for Structural Condition Assessment of Existing Buildings;" as well as, Institute for Nuclear Power Operations (INPO) Good Practice document 85-033, "Use of System Engineers;" and NEI 96-03, "Guidelines for Monitoring the Condition of Structures at Nuclear Plants."

Prior to the period of extended operation, the Structures Monitoring Program implementing procedures will be enhanced to: (1) identify the License Renewal structures and systems that credit the program for aging management, (2) require notification of the responsible engineer when below-grade concrete is exposed so an inspection may be performed prior to backfilling, (3) require periodic groundwater chemistry monitoring including consideration for potential seasonal variations., (4) define the term “structures of a system” in the system walkdown procedure and specify the condition monitoring parameters that apply to "structures of a system," (5) include the corporate structures monitoring procedure as a reference in the plant implementing procedures and specify that forms from the corporate procedure be used for inspections, (6) identify additional civil/structural commodities and associated inspection attributes required for License Renewal, and (7) require inspection of inaccessible surfaces of reinforced concrete pipe when exposed by removal of backfill. Following enhancement, the Structures Monitoring Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.32 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program

The Regulatory Guide (RG) 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is an existing program that consists of an inspection and surveillance program used to manage the aging effects of the dams and spillways, dikes, canals, reservoirs, and the intake, screening and discharge structures associated with emergency cooling water system. The Program meets the requirements of RG 1.127, Revision 1.

Prior to the period of extended operation, the Program will be enhanced to: (1) require an evaluation of any concrete deficiencies in accordance with the acceptance criteria provided in the corporate inspection procedure, (2) require initiation of a Nuclear Condition Report (NCR) for degraded plant conditions and require, as a minimum, the initiation of an NCR for any condition that constitutes an "unacceptable" condition based on the acceptance criteria specified, and (3) require documentation of a visual inspection of the miscellaneous steel at the Main Dam and Spillway. Following enhancement, the program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.33 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cables and connections not included in the HNP Environmental Qualification (EQ) Program. Under this Program, accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, swelling, or surface contamination, which are precursor indications of conductor insulation aging degradation from heat, radiation or moisture. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service condition for the electrical cable or connection. This Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.34 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program credited for the aging management of radiation monitoring and nuclear instrumentation cables not included in the HNP EQ Program. Exposure of electrical cables to adverse localized environments caused by heat or radiation can result in reduced insulation resistance (IR). A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies. For radiation monitoring circuits and the RG 1.97 wide range neutron flux monitoring circuits, the review of calibration results or findings of surveillance testing will be used to identify the potential existence of cable system aging degradation. This review will be performed at least once every 10 years, with the first review to be completed before the end of the current license term. Cable systems used in excore source, internediate, and power range nuclear instrumentation circuits will be tested at a frequency not to exceed 10 years based on engineering evaluation, with the first testing to be completed before the end of the current license term. Testing may include IR tests, time domain reflectometry tests, current versus voltage testing, or other testing judged to be effective in determining cable system insulation condition. This Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.35 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cables not included in the HNP EQ Program. In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. Manholes associated with inaccessible non-EQ medium-voltage cables will be inspected for water accumulation and drained, as needed. The manhole inspection frequency will be based on actual field data and shall not exceed two years. The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.36 Metal Enclosed Bus Program

The Metal Enclosed Bus Program is a new program credited for the aging management of the iso-phase bus as well as non-segregated 6.9KV and 480V metal enclosed bus within the scope of License Renewal. The program involves various activities conducted at least once every 10 years to identify the potential existence of aging degradation. In this aging management program, a sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. In addition, the internal portions of the bus enclosure will be visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion. The bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be visually inspected for structural integrity and signs of cracks. The Metal Enclosed Bus Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.37 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program credited for the aging management of cable connections not included in the HNP EQ Program. Samplings of cable connections within the scope of License Renewal will be tested at least once every 10 years to provide an indication of the integrity of the cable connections. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting loose connections, such as thermography, contact resistance testing, bridge balance testing, or other appropriate testing judged to be effective in determining cable connection integrity. The technical basis for selecting the sample cable connections to be tested will be provided. The scope of this sampling program will include electrical cable connections in power and I&C applications, as well as connections in areas with corrosive chemicals, and connections located in outdoor structures with an uncontrolled environment. In addition, the program will include the bolted connections on the overhead transmissions conductors from the high voltage bushings on the main power transformers to the switchyard bus. The Program is consistent with the corresponding program described in NUREG-1801.

A.1.1.38 Reactor Coolant Pressure Boundary Fatigue Monitoring Program

The Reactor Coolant Pressure Boundary (RCPB) Fatigue Monitoring Program is an existing program that includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the RCPB. This is accomplished by monitoring and tracking the significant thermal and pressure transients for limiting RCPB components in order to prevent the fatigue design limit from being exceeded. The Program addresses the effects of the reactor coolant environment on component fatigue life by including, within the program scope, environmental fatigue evaluations of the sample locations specified in NUREG/CR-6260, "Application of NUREG/CR-5999, Interim Fatigue Curves to Selected Nuclear Power Plant Components."

Prior to the period of extended operation, the Program will be enhanced to: (1) expand the program scope to include an evaluation of selected RCPB components beyond the reactor pressure vessel (including auxiliary system components such as the pressurizer lower head, pressurizer surge line, and CVCS piping and heat exchanger), and to include the NUREG/CR-6260 locations analyzed for environmental effects, (2) provide preventive actions to include, prior to a monitored location exceeding a cumulative usage factor limit of 1.0, evaluation of operational changes to reduce the number or severity of future transients, (3) include a provision to utilize online fatigue analysis software for the periodic updating of cumulative usage, (4) describe the acceptance criteria for maintaining fatigue usage below the design limit, and (5) address corrective actions for components approaching design limits, with options to include a revised fatigue analysis or repair or replacement of the component. Following enhancement, the RCPB Fatigue Monitoring Program will be consistent with the corresponding program described in NUREG-1801.

A.1.1.39 Environmental Qualification (EQ) Program

The existing HNP EQ Program, which implements the requirements of 10 CFR 50.49, will adequately manage aging of EQ equipment for the period of extended operation. 10 CFR 50.49 requires EQ components that are not qualified for the current license term to be refurbished, replaced, or have their qualifications extended prior to reaching the aging limits established in the aging evaluation. Reanalysis of aging evaluations to extend the qualifications of components is performed on a routine basis as part of the EQ Program. Important attributes for the reanalysis of aging evaluations include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions (if acceptance criteria are not met). Time-Limited Aging Analysis (TLAA) demonstration option 10 CFR §54.21(c)(1)(iii), which states that the effects of aging will be adequately managed for the period of extended operation, has been chosen. The EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA. This Program is consistent with the corresponding program described in NUREG-1801.

A.1.2 EVALUATION OF TIME LIMITED AGING ANALYSES

A.1.2.1 Reactor Vessel Neutron Embrittlement

Calculations have been performed to determine neutron fluence projections applicable to the reactor vessel and internals at 55 EFPY, which bounds 60 years of operation, using an NRC-approved methodology applicable to HNP. The methodology used is documented in the AREVA report, BAW-2241, "Fluence and Uncertainty Methodologies," Revision 1. Using the AREVA methodology, the data from Capsule X, which was removed from the reactor vessel at the end of cycle 8, and a value of 55 EFPY, projected values of neutron flux were obtained for use in the fluence-related analyses. In addition, the reactor pressure vessel boundary components outside the beltline region have been evaluated to determine whether additional materials should be considered "beltline" material for the period of extended operation. The beltline, as defined by 10 CFR 50.61(a)(3), is the region of the reactor pressure vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor pressure vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection for the most limiting material with regard to radiation damage. The threshold fluence for beltline material is 1×10^{17} n/cm^2, E > 1.0 MeV. The materials outside of the traditional beltline region which are expected to receive fluence values greater than 10^{17} n/cm^2 were evaluated, and none of these materials were determined to be limiting.

Therefore, the neutron fluence has been projected to the end of the period of extended operation using a methodology previously approved by the NRC. The 55 EFPY fluence projections will be used for evaluating the following fluence-based analyses.

A.1.2.1.1 Upper Shelf Energy Evaluation

10 CFR 50, Appendix G, contains screening criteria that limit the degree that the upper shelf energy (USE) value for a reactor pressure vessel material may be allowed to drop due to neutron radiation exposure. The regulation requires the initial USE for a reactor pressure vessel material to be greater than 75 ft.-lb. when the material is in the unirradiated condition, and for the USE to remain above 50 ft.-lb. in the fully irradiated condition throughout the licensed life of the vessel, unless it is demonstrated that lower values of energy will provide margins of safety against fracture equivalent to those required by the ASME Code, Section XI, Appendix G.

An evaluation of the HNP RPV for the License Renewal period (55 EFPY) USE for the HNP reactor vessel beltline materials was performed using the guidelines in RG 1.99, Revision 2. The evaluations for the decreases in USE of the HNP reactor vessel were performed at the 1/4T wall location of each beltline material using the respective copper contents and Figure 2 of RG 1.99, Revision 2. The HNP RV beltline material with the lowest predicted USE is the intermediate shell plate, heat number B4197-2; however, the predicted value for this material is not projected to fall below the required 50 ft-lb limit. Therefore, the analyses for the decreases in USE of the HNP RV have been projected to the end of the 60-year period of extended operation. The analyses demonstrate that, for the most limiting material, the lowest predicted USE is greater than the 10 CFR 50, Appendix G, limit of 50 ft-lbs.

Therefore, the HNP USE analysis has been projected to the end of the License Renewal period of extended operation.

A.1.2.1.2 Pressurized Thermal Shock Analysis

10 CFR 50.61 defines screening criteria for embrittlement of reactor pressure vessel materials in pressurized-water reactors, as well as actions that are required if these screening criteria are exceeded. The screening criteria limit the degree that a vessel material may increase in its reference temperature for pressurized thermal shock - RT_{PTS}, following neutron irradiation of the reactor pressure vessel. For circumferential welds, the pressurized thermal shock (PTS) screening criterion is 300°F maximum. For plates, forgings, and axial weld materials, the screening criterion is 270°F maximum. The projected EOL RT_{PTS} values must be shown to remain below the applicable screening temperature.

A PTS evaluation for the HNP RV beltline materials was performed in accordance with 10 CFR 50.61. The PTS reference temperature, RT_{PTS}, values are calculated by adding the initial nil-ductility reference temperature, RT_{NDT}, to the predicted radiation-induced ΔRT_{NDT} and the margin term to cover the uncertainties in the values of initial RT_{NDT} copper and nickel contents, fluence, and the calculational procedures. The predicted radiation induced ΔRT_{NDT} is calculated using the respective RV beltline materials copper and nickel contents and the neutron fluence applicable to the HNP RV for License Renewal at 55 EFPY.

The evaluations for the HNP RT_{PTS} values were performed for each HNP reactor vessel beltline material with chemistry factors determined from Tables 1 and 2 in 10 CFR 50.61. In addition, the chemistry factors for the intermediate shell plate, heat no. B4197-2, and the intermediate shell to lower shell circumferential weld are recalculated using the available HNP surveillance data.

The RT_{PTS} values for the HNP RV beltline materials at 55 EFPY were determined. The results of the PTS evaluation demonstrate that the HNP RV beltline materials will not exceed the PTS screening criteria before the end of the period of extended operation. The controlling beltline material for the HNP reactor vessel with respect to PTS is the intermediate shell plate, heat number B4197-2, with a RT_{PTS} value of 199.9°F which is well below the PTS screening criterion of 270°F.

Therefore, the analyses for the shift in PTS reference temperature of the HNP reactor vessel have been projected to the end of the period of extended operation.

A.1.2.1.3 Operating Pressure-Temperature (P-T) Limits Analysis

The Adjusted Reference Temperature (ART) is the value of Initial RT_{NDT} + ΔRT_{NDT} + margins for uncertainties at a specific location. Neutron embrittlement increases the ART. Thus, the minimum temperature at which a reactor vessel is allowed to be pressurized increases over the licensed period. The ART of the limiting beltline material is used to correct the beltline Pressure-Temperature (P-T) limits to account for radiation effects. 10 CFR Part 50 Appendix G requires reactor vessel thermal limit analyses to determine operating P-T limits for boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences. Operating limits for pressure and temperature are required for three categories of operation: 1) hydrostatic pressure tests and leak tests, 2) non-nuclear heat-up/cooldown and low level physics tests, and 3) core critical operation.

The ART values for the HNP reactor vessel beltline region materials are calculated in accordance with Regulatory Guide 1.99, Revision 2, by adding the initial RT_{NDT} to the predicted radiation-induced ΔRT_{NDT}, and a margin term to cover the uncertainties in the values of initial RT_{NDT}, copper and nickel contents, fluence, and the calculational procedures. The predicted radiation-induced ΔRT_{NDT} is calculated using the respective reactor vessel beltline materials copper and nickel contents and the neutron fluence applicable to 55 EFPY. The evaluations for the HNP ART were performed at the 1/4T and 3/4T wall location of each beltline material with chemistry factors determined from Tables 1 and 2 in Regulatory Guide 1.99, Revision 2. In addition, the chemistry factors for the intermediate shell plate, heat no. B4197-2, and the intermediate shell to lower shell circumferential weld are recalculated using the available HNP surveillance data.

In this manner, ART results for the HNP reactor vessel beltline region materials applicable to 55 EFPY were determined. Based on these results, the controlling beltline material for the HNP reactor vessel is the intermediate shell plate, heat no. B4197-2. The P-T limit curves show that adequate operating margins will be provided.

Therefore, the P-T limits analysis for HNP has been projected to the end of the period of extended operation.

A.1.2.1.4 Low-Temperature Overpressure Limits Analysis

ASME Section XI, Appendix G, establishes procedures and limits for RCS pressure and temperature primarily for low temperature conditions to provide protection against non-ductile failure of the reactor vessel. The Low Temperature Overpressure Protection System (LTOPS) assures that these limits are not exceeded when it is enabled at low temperatures.

No analysis of LTOP setpoints has been performed to support operation to the end of the period of extended operation for License Renewal. The LTOP setpoint analysis will be recalculated following the removal of one of the remaining surveillance capsules from the vessel. The surveillance capsule will be removed when the calculated fast neutron fluence on the capsule meets or exceeds the calculated fast neutron fluence on the vessel wall at the end of the period of extended operation.

A.1.2.2 Metal Fatigue

The HNP approach is to identify the latest design fatigue analyses associated with each NSSS component within the RCPB in order to demonstrate that the design analyses will remain bounding through the period of extended operation.

The first step in the evaluation was to establish the current design basis for the major NSSS components. This was done by reviewing the current design transients and past operational transients. This review showed that the use of transients provided by the HNP steam generator replacement/uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see Subsections A.1.2.2.6 and A.1.2.2.7). Therefore the governing transients "NSSS Design Transients" are those identified in the HNP steam generator replacement/uprating analysis.
The next step in the explicit evaluation was to gather and review plant design information. This information was used to develop actual operational transients experienced from June 4, 1985 to October 18, 2004. This data was gleaned from the HNP Cycle and Transient Monitoring Program records, input from plant personnel, and historical data obtained from the HNP Plant Information System.

The next step was to determine 60-year cycle projections. The projected numbers of cycles for 60 years of operation were established by using the average rate of occurrence based on the transient cycle counts to-date (18 years) and projecting them for 60 years of operations. The resulting 60-year projections were then compared to the number of design cycles for each transient to determine the adequacy of the current fatigue analyses based upon the 40-year cycles.

Additional analyses were required for several "partial cycle" transients. This was to account for transients of much less severity than design, so that the less severe transients would not be counted as full design cycles. The ANSI B31.1 Power Piping Code, 1967 Edition, Section 102.3.2, provides the equation and methodology for mathematically determining the number of equivalent full temperature range changes that result from the number of lesser temperature range changes.

Through use of this approach, HNP was able to demonstrate the original design fatigue calculations remained valid through the period of extended operation for all analyzed components except the following sub-components of the Steam Generators and the Pressurizer:

- Steam Generator Secondary Manway Bolts
- Steam Generator 4 in. Inspection Port Bolts
- Pressurizer Surge Line
- Pressurizer (portions of the lower head)

The next step in the HNP approach was to re-analyze the above components using plant-specific data and/or by removing unnecessary conservatisms. The re-analyses of the above components resulted in 60-year fatigue usages which remained within the ASME Code allowable value of 1.0. The analyses for these components are discussed further in Subsections A.1.2.2.5, A.1.2.2.6, and A.1.2.2.7.

The final step in the HNP evaluation was to factor the effects of the reactor water environment on fatigue. The environmental fatigue evaluation is addressed below.

The following subsections provide a summary of the evaluation results for each of the major NSSS components evaluated.

A.1.2.2.1 Reactor Vessel Fatigue Analyses

TLAAs have been identified for several sub-components of the Reactor Vessel. As stated above, the use of transients provided by the HNP steam generator replacement/ uprating analysis is reasonable and limiting for the primary equipment with the exception of the pressurizer surge line and portions of the pressurizer lower head which were analyzed separately (see Subsections A.1.2.2.6 and A.1.2.2.7). Therefore the NSSS Design Transients are those identified in the HNP steam generator replacement/ uprating analysis. Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis. The reactor vessel fatigue analysis demonstrated that if the reactor vessel components were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0.

Using the approach described in Section A.1.2.2 above, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60-year operating term. For the components that comprise the Reactor Vessel, the highest 60-year design fatigue usage value is 0.37 for the closure studs. This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Therefore, the Reactor Vessel Fatigue Analyses have been determined to remain valid for the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.2 Reactor Vessel Internals Fatigue Analyses

Using the fatigue information derived during the steam generator replacement/ uprating discussed in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the 60-year cycle projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60 year operating term. For the Reactor Vessel Internals, the 60-year design fatigue usage value is 0.52 for the core internals. This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Therefore, the Reactor Vessel Internals Fatigue Analyses have been determined to remain valid for the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.3 Control Rod Drive Mechanism Fatigue Analysis

Using the general approach described in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations. Therefore, the current design usage factors may be used for the 60-year operating term. For the CRDM, the highest 60-year design fatigue usage value is 0.99 for the "Lower Joint Canopy Area." This value does not exceed the design limit of 1.0 and is therefore acceptable.

Therefore, the CRDM Fatigue Analyses have been determined to remain valid for the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.4 Reactor Coolant Pumps Fatigue Analysis

The current design fatigue analysis for the HNP RCPs was performed using the ASME Code [NB-3222.4(d)] waiver of fatigue requirements. Therefore, it was unnecessary to determine a 40-year or 60-year fatigue usage factor for the Reactor Coolant Pumps. Using the general approach described in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the fatigue waiver remains valid for 60 years of operations.

Therefore, the Reactor Coolant Pumps Fatigue Analyses have been determined to remain valid for the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.5 Steam Generators Fatigue Analysis

Forty-year design CUF values were also determined as part of the HNP steam generator replacement/uprating analysis. The Steam Generator fatigue analysis demonstrated that if the Steam Generator subcomponents were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0 with the exception of the Secondary Manway Bolts and the 4 in. Inspection Port Bolts.

Using the general approach described in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the 60-year projected cycles, the current design basis fatigue usage values do not exceed the design limit of 1.0 and are acceptable for all original design evaluations except for the following components:

- Steam Generator Secondary Manway Bolts
- Steam Generator 4 in. Inspection Port Bolts

The Secondary Manway Bolts and 4 in. Inspection Port Bolts were identified as having 60-year design fatigue usage factors over 1.0. The current design fatigue usage factors were also over 1.0, however, these components were identified "to be replaced based on a replacement schedule." Management of the aging effect in this manner would have been acceptable as allowed by 10 CFR 54.21(c)(1) method (iii). However, HNP re-analyzed the Steam Generator Secondary Manway Cover Bolts and 4 in. Inspection Port Bolts to remove unnecessary conservatisms. The updated evaluation changed only the number of Unit Loading and Unit Unloading transient cycles relative to the previous design analysis. Each transient was conservatively considered to occur 2000 times over the life of the plant, a number which is still greater than the best estimate number provided in the previous design analysis.

Fatigue usage for the bolts based on the reduced Unit Loading and Unit Unloading cycles are as follows:

- Secondary Manway Cover Bolts: Fatigue Usage = 0.83
- 4 in. Inspection Port Bolts: Fatigue Usage = 0.81

Since the fatigue usage values for the above bolts do not exceed 1.0, they are acceptable for the number of cycles postulated in the analysis, (i.e. design allowable cycles for all transients except for the Unit Loading and Unit Unloading transients with

2000 cycles each). Therefore, these components were deemed acceptable through the period of extended operation.

For the remaining components that comprise the Steam Generators, the highest 60-year design fatigue usage value is 0.98 for the "Minor Shell Taps." This value does not exceed the design limit of 1.0 and is therefore acceptable for the original design evaluations.

Therefore, the Steam Generators Fatigue Analyses have been determined to remain valid for the period of extended operation, or, in the case of Secondary Manway Cover Bolts and 4 in. Inspection Port Bolts, have been projected to the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.6 Pressurizer Fatigue Analysis

The Pressurizer fatigue analysis demonstrated that if the Pressurizer subcomponents were exposed to a bounding set of postulated transient cycles, the CUF values for the components would not exceed 1.0 for all components. However, certain locations of the Pressurizer lower head are not bounded by the original design fatigue analysis, because the original fatigue analysis did not consider insurge/outsurge transients that were identified subsequent to the original fatigue analysis. Therefore, the pressurizer lower head locations were re-analyzed for 60-year transients by means of a separate fatigue analysis considering plant-specific cyclic data.

Using the general approach described in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the projected cycles, the current design basis fatigue usage values do not exceed the design limit of 1.0 for all components of the pressurizer with the highest value being 1.00 for the Trunnion Bolt Hole. Therefore, the 60-Year Design Fatigue Usage values for the pressurizer components are acceptable for all original design evaluations except for portions of the lower pressurizer head.

Recommendations of the Westinghouse Owners Group (WOG) were used to address operational pressurizer insurge/outsurge transients. These include reviewing plant operating records in sufficient detail to determine pressurizer insurge/outsurge transients for past operation, updating pressurizer lower head and surge nozzle transients to reflect past and projected future operations, and evaluating the impact of the updated transients on the structural integrity of the pressurizer. The WOG also recommended operating strategies that may be used in the future to address the insurge/outsurge issue. On January 20, 1994, HNP adopted the Modified Operating Procedures (MOP) recommended by the WOG to mitigate pressurizer insurge/outsurge transients.

Plant data was used to establish pre-MOP transients and post-MOP transients that represent past plant heatup and cooldown operations. This data was used to predict 60-year fatigue usage based on maintaining current operating practices.

Fatigue evaluations of the pressurizer lower head and surge line nozzle were performed using the online monitoring and Westinghouse proprietary design analysis features of the WESTEMS™ Integrated Diagnostics and Monitoring System. The fatigue evaluations follow the procedures of ASME Code, Section III, NB-3200. The stress ranges, cycle pairing, and fatigue usage factors were calculated using WESTEMS™, consistent with the ASME Code and WOG recommendations. The 60-year fatigue evaluations were performed at critical locations of the pressurizer lower head and of the surge line RCS hot leg nozzle.

The ASME Section III fatigue requirements were shown to be met for the controlling locations evaluated for the 60 years of operation. For the 60 years of plant life, the pressurizer lower head has the highest fatigue usage of 0.24 at the inside surface of the lower head at the heater penetration region. This is well within the Code allowable of 1.0. Therefore, it is concluded that the fatigue requirements are satisfied for the 60 years of operation.

Therefore, the Pressurizer Fatigue Analyses have been determined to remain valid or have been projected to the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.7 Reactor Coolant Pressure Boundary Piping (ASME Class 1) Fatigue Analysis

The 40-year Reactor Coolant Pressure Boundary (RCPB) Piping fatigue analysis demonstrated that, if the RCPB piping components were exposed to a bounding set of postulated transient cycles, the CUF values for the components do not exceed 1.0. However, the Pressurizer Surge Line is not bounded by the original design fatigue analysis.

In response to NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification, HNP evaluated the pressurizer surge line stratification transients separately for 40 years of operation. The 60-year projected cycles could not be shown to be bounded by the 40-year transients for the pressurizer surge line. Therefore, the surge line was re-analyzed for 60-year transients considering the effects of thermal stratification and plant-specific cyclic data.

Using the general approach described in Section A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the projections, the current design fatigue usage factors remained valid for 60 years of operations except for the Pressurizer Surge Line which is not considered bounded by the original analysis. For the components that comprise the RCPB Piping, the highest 60-year design fatigue usage value is 0.98 for the Pressurizer Spray Piping. Therefore, the 60-Year Design Fatigue Usage values for the RCPB Piping components are acceptable for the original design evaluations except for the Pressurizer Surge Line. The Pressurizer Surge Line was evaluated with the Pressurizer Lower Head as described in Section A.1.2.2.6 and determined to be acceptable.

Therefore, the RCPB Piping (ASME Class 1) Fatigue Analyses have been determined to remain valid or have been projected to the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.8 ASME Class 2 and 3 Piping Fatigue Analysis

HNP auxiliary piping that was designed to ASME Section III, Code Class 2 and 3, requirements did not require an explicit fatigue evaluation. Instead, the Code includes implicit treatment of fatigue using a stress range reduction factor, which is a function of the total number of thermal expansion stress range cycles. The factor is equal to 1.0 for up to 7,000 cycles. For greater number of cycles, the factor may be further reduced, thereby reducing the thermal expansion stress allowable.

It is reasonable to conclude that most Class 2 and 3 components, which are connected to the Class 1 piping, are subject to the same thermal cycles associated with RCS operation as the Class 1 piping. Therefore, for a given Class 2 or 3 piping system, the applicable transient cycles may be estimated by summing the individual transients counted for the adjacent Class 1 piping system. If this number of cycles is less than 7,000, the full stress range reduction factor f = 1.0 would apply, and the components could operate for the 60-year period without exceeding the design allowable stresses. Since the 60-year projected numbers of thermal cycles for the Class 1 RCS components have been shown to be less than the 40-year design cycles, it is also reasonable to conclude that the number of thermal cycles expected to occur in 60 years for the Class 2 and 3 components will be less than originally postulated during the design process. Therefore, the original design evaluations for the Class 2 and 3 components remain valid for 60 years.

Since this evaluation is based on the 60-year transient cycle projections for the Class 1 RCS components, the HNP Fatigue Monitoring Program must continue to be used to validate the assumptions used in the evaluations. Therefore, the ASME Class 2 and 3 Piping Fatigue Analyses have been determined to remain valid through the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.9 ANSI B31.1 Piping Fatigue Analysis

HNP auxiliary piping that was designed to ANSI B31.1 requirements did not require an explicit fatigue evaluation. Instead, for ANSI B31.1 piping, the "Power Piping" Code includes implicit treatment of fatigue using a stress allowable reduction factor, which is a function of the total number of thermal expansion stress range cycles. The factor is equal to 1.0 for up to 7,000 cycles. For greater number of cycles, the factor may be further reduced, thereby reducing the thermal expansion range stress allowable.

This discussion addresses ANSI B31.1 piping that was designed for systems with operating cycles corresponding to Class 1 design cycles. Piping that was designed for cyclic loading that may not correspond to Class 1 design cycles is evaluated separately. Therefore, for piping that was designed for cycles corresponding to ASME Section III, Class 1 design cycles, it is reasonable to conclude that the subject ANSI B31.1 piping are subject to the same thermal cycles associated with RCS operation as the Class 1 piping. Therefore, for a given ANSI B31.1 piping system, the applicable transient cycles may be estimated by summing the individual transients counted for the adjacent Class 1 piping system. If this number of cycles is less than 7,000, the full stress range reduction factor of 1.0 would apply, and the components could operate for the 60-year period without exceeding the design allowable stresses.

Since the 60-year projected numbers of thermal cycles for the Class 1 RCS components have been shown to be less than the 40-year design cycles, it is also reasonable to conclude that the number of thermal cycles expected to occur in 60 years for the ANSI B31.1 piping components will be less than originally postulated during the design process. Therefore, based upon the 60-year projected number of cycles for Class 1 components, the original design evaluations for the ANSI B31.1 piping components remain valid for 60 years.

Since this evaluation is based upon the 60-year transient cycle projections for the Class RCS components, the HNP Fatigue Monitoring Program must continue to be used to validate the assumptions used in the evaluations. Therefore, the ANSI B31.1 Piping Fatigue Analyses, for systems with operating cycles corresponding to Class 1 design cycles, have been determined to remain valid through the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

A.1.2.2.10 Environmentally-Assisted Fatigue Analysis

The effects of reactor water environment on fatigue were evaluated for a subset of representative components based on the evaluations in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Design Curves to Selected Nuclear Power Plant

Components." Since HNP Class 1 piping was designed in the more recent history of Westinghouse plant design, the locations corresponding to the "Westinghouse Newer Vintage Plant" were selected:

- Reactor Vessel Shell and Lower Head
- Reactor Vessel Inlet and Outlet Nozzles
- Pressurizer Surge Line
- Charging Nozzle
- Safety Injection Nozzle
- Residual Heat Removal (RHR) System Class 1 Piping

In addition to the above, locations in the pressurizer lower head that are potentially subject to insurge/outsurge transients were evaluated considering reactor water environmental effects.

The environmental effects on fatigue were evaluated based on NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low Alloy Steels," NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," and NUREG/CR-6717, "Environmental Effects of Fatigue Crack Initiation in Piping and Pressure Vessel Steels." Environmental fatigue penalty factors (Fen) were used to obtain adjusted cumulative fatigue usage (Uen) which includes the effects of reactor water environments.

It was concluded that environmentally-adjusted 60-year cumulative fatigue usage factor (Uen) values remained within the ASME Code allowable value of 1.0 and were, therefore, acceptable.

A.1.2.2.11 RCS Loop Piping Leak-Before-Break Analysis

In accordance with the CLB, a Leak-Before-Break (LBB) analysis was performed to show that any potential leaks that develop in the Reactor Coolant System (RCS) loop piping can be detected by plant leak monitoring systems before a postulated crack causing the leak would grow to unstable proportions during the 40-year plant life. LBB evaluations postulate a surface flaw at a limiting stress location, and demonstrate that a through-wall crack will not result following exposure to a lifetime of design transients. A separate evaluation assumes a through-wall crack of sufficient size, such that the resultant leakage can be easily detected by the existing leakage monitoring system, and then demonstrates that, even under maximum faulted loads, this crack is much smaller than a critical flaw size that could grow to pipe failure. The aging effects to be addressed during the period of extended operation include thermal aging of the primary loop piping components and fatigue crack growth.

WCAP-14549-P, Addendum 1, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Harris Nuclear Plant for the License Renewal Program," is a new LBB calculation applicable to HNP large bore RCS piping and components that includes allowances for reduction of fracture toughness of cast austenitic stainless steel due to thermal embrittlement during a 60-year operating period. This calculation concluded:

1. Stress corrosion cracking is precluded by use of fracture resistant materials in the piping system and controls on reactor coolant chemistry, temperature, pressure, and flow during normal operation. Currently an EPRI Material Reliability Program is underway to address the Alloy 82/182 Primary Water Stress Corrosion Cracking issue for the industry due to the V. C. Summer cracking incident. However, calculations for Alloy 82/182 locations were performed and this material is not bounding.

2. Water hammer should not occur in the RCS piping because of system design, testing, and operational considerations.

3. The effects of low and high cycle fatigue on the integrity of the primary piping are negligible. The fatigue crack growth evaluated is insignificant.

4. A margin of 10 exists between the leak rate of small stable leakage flaws and the capability (1 gpm) of the HNP RCS pressure boundary Leakage Detection System.

5. A margin of two or more exists between the small stable leakage flaw sizes of and the larger critical stable flaws.

6. Ample margin exists in stability using 60-year thermal aging material properties.

The new analysis meets the requirements for LBB required by 10 CFR 50, Appendix A, General Design Criterion 4, and uses the recommendations and criteria from the NRC Standard Review Plan for LBB evaluations.

Therefore, the RCS primary loop piping LBB analysis has been projected to the end of the period of extended operation.

A.1.2.2.12 Primary Sample Lines Fatigue Analysis

Portions of the Primary Sampling System may be subjected to thermal transients that are unrelated to those experienced by Class 1 components There are three sample line penetrations involved - RCS Hot Leg (M-78A), Pressurizer Liquid Space (M-78B), and Pressurizer Steam Space (M-78C). The analyses below determined for the equipment that is part of this TLAA, the number of thermal cycles that they would be subjected and compared to the 7,000 cycle criterion. The cycles are based on the manner in which they are used.

Penetration M-78A - RCS Hot Legs

The piping downstream of M-78A include three parallel branch lines that supply the Post Accident Sample Panel in the Post Accident Sampling System (PASS), the Primary Sample Panel in the Reactor Coolant Sample System and the Gross Failed Fuel Detector in the Gross Failed Fuel Detection System. Depending on sample system operations, the number of thermal cycles experienced would be greater than the number of cycles caused by reactor shutdowns. Additional cycles would occur when sampling points are swapped or sampling equipment is isolated.

The number of cycles due to reactor shutdowns and the number of penetration M-78A isolations that would result in a thermal cycle were estimated based on a review of plant data. Extrapolating this data to a 60-year period, the number of cycles would be:

- 1,000 thermal cycles from sample point swapping,
- 81 thermal cycles from reactor shutdown, and
- 198 thermal cycles from penetration isolations.

Therefore, total number of Hot Leg Thermal Cycles for penetration M-78A is 1,279 cycles, which is less than the requisite 7,000 cycles.

Penetration M-78B - Pressurizer Liquid Space

This penetration supplies the primary sample panel and is cycled every time it is used to sample the Pressurizer liquid space. The number of thermal cycles was estimated to be 3,120 based on weekly sampling over a 60-year period. Because this line is connected to the Pressurizer, the estimated number of reactor thermal cycles over 60 years, i.e., 81, was added to the above value. This results in 3,201 thermal cycles, which is less than the requisite 7,000 cycles.

Penetration M-78C - Pressurizer Steam Space

The sample line associated with the Pressurizer steam space penetration (M-78C) is normally used during degassing for reactor shutdown conditions and also for sampling following a postulated accident. A portion of the sample line is exposed to steam from the Pressurizer. Every time condensate is removed, the line has an opportunity to heat up again. It is conservatively assumed that the condensate will be drained at least once an operating cycle during testing of the isolation valves. Consequently, the number of thermal cycles for the sample lines is estimated to be approximately 81 cycles, which is less than the requisite 7,000 cycles. Since the total number of thermal cycles for the sample lines is less than 7,000 cycles, no reanalysis of the piping design is necessary. Therefore, the primary sample line design analyses of record remain valid for the period of extended operation.

A.1.2.2.13 Steam Generator Blowdown Lines Fatigue Analysis

Steam Generator blowdown flow is normally maintained during operation in order to maintain Steam Generator water chemistry. A thermal cycle in the Blowdown lines may result whenever Blowdown flow is interrupted. These interruptions have the potential to result in thermal cycles over and above the heat-up and cooldown cycles of the RCS.

Blowdown interruptions were determined using actual plant date and projecting the number of interruptions through the period of extended operation. A conservative method was chosen such that one cycle was counted when Blowdown flow was interrupted for more than 30 minutes. For the purposes of thermal fatigue, a complete thermal cycle is defined as a heat up from ambient to operating temperature followed by a cooldown to ambient temperature. The criterion adopted for counting thermal cycles is conservative because it includes interruptions of Blowdown flow in which a significant decrease in temperature is not expected. This is based on the operating practice for reestablishing Blowdown flow following a isolation which requires the downstream piping to be warmed-up prior to opening the isolation valves if the isolation valves were closed for more than 30 minutes. It follows then that if an isolation valve is closed for less than 30 minutes this does not constitute a significant cooldown period.

The number of cycles due to reactor shutdowns was added to the projected isolation cycles and resulted in a 60-year value of 404 cycles. Since the total number of projected thermal cycles for the Steam Generator Blowdown lines is less than 7,000 cycles, no reanalysis of the piping design calculations is necessary. Therefore, the Steam Generator Blowdown Line fatigue analysis remains valid for the period of extended operation.

A.1.2.3 Environmental Qualification of Electric Equipment

The existing HNP EQ Program is credited for aging management of electric equipment important to safety in accordance with the requirements of 10 CFR 50.49. 10 CFR 50.49 requires EQ components that are not qualified for the current license term to be refurbished, replaced, or have their qualifications extended prior to reaching the aging limits established in the aging evaluation. Reanalysis of aging evaluations to extend the qualifications of components is performed on a routine basis as part of the EQ Program. Important attributes for the reanalysis of aging evaluations include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions (if acceptance criteria are not met). TLAA demonstration option 10 CFR §54.21(c)(1)(iii), which states that the effects of aging will be adequately managed for the period of extended operation, has been chosen. The EQ Program will manage the aging effects of the components associated with the environmental qualification TLAA. This Program is consistent with the corresponding program described in NUREG-1801.

A.1.2.4 Containment Mechanical Penetration Bellows Fatigue

A.1.2.4.1 Mechanical Penetration Bellows - Valve Chambers

The four mechanical penetration bellows addressed by this section are the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows associated with containment penetrations M-47 through M-50. Per the plant specifications, the valve chamber bellows expansion joint design is in accordance with ASME Section III, Paragraph NC-3649.1 so that no single corrugation is permitted to deflect more than its maximum allowable amount. Each bellows is designed to withstand a total of 7,000 cycles of expansion and compression over its lifetime due to maximum normal operating conditions plus 10 cycles of movement due to safe shutdown earthquake condition.

Operating cycles of expansion and compression due to maximum normal operating conditions was calculated by adding the number of containment cycles corresponding to RCS heat-up and cooldown cycles plus the number of times the containment is pressurized during Type A Integrated Leak Rate Testing (ILRT) plus the number times a Type B local leak rate test (LLRT) is performed.

The expansion bellows is the barrier between the valve chamber and the Reactor Auxiliary Building. The containment isolation valves associated with these chambers isolate the containment sumps from the Containment Spray and RHR Systems and, therefore, do not normally experience any fluid flow. Operation of RHR during cool-down of the RCS would have a negligible impact on the bellows due to the piping configuration but are included since operation of RHR would typically correspond to the Reactor Coolant System (Class 1) cycles.

The number of Reactor Thermal Cycles projected over 60 years is 81 cycles. The containment ILRT is performed infrequently, i.e., once every 10 years. Conservatively assuming an ILRT will be performed once every 5 years rather than the maximum period of 10 years yields 12 cycles. Per Type B Local Leak Rate Test program the maximum test interval for this equipment is 24 months. Since this is the maximum interval, the minimum will be conservatively assumed to be yearly resulting in an additional 60 cycles. The total number of cycles anticipated for 60 years is

$$81 + 12 + 60 = 153 \text{ cycles.}$$

Since the total number of thermal cycles for the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows is less than 7,000 cycles, no reanalysis of the design calculations is necessary. Therefore, the Containment Spray and Safety Injection System Recirculation Valve Chamber Bellows design analyses of record remain valid for the period of extended operation.

A.1.2.4.2 Mechanical Penetration Bellows - Fuel Transfer Tube Bellows Expansion Joint

Per plant specifications, the Fuel Transfer Tube bellows-expansion-joint design is in accordance with ASME Section III, Paragraph NC-3649.1, and such that no single corrugation is permitted to deflect more than its maximum allowable amount. Each bellows shall be designed to withstand a total of 7,000 cycles of expansion and compression over its service lifetime, due to maximum normal operating conditions, plus 10 cycles of movement due to the safe shutdown earthquake condition.

The expansion cycles would occur when the tube is flooded between the transfer canal in the Containment Building and the Fuel Handling Building. This typically occurs twice every refueling cycle. The maximum number of operating cycles projected to be experienced over a 60-year period is 80 cycles assuming a refueling outage every 1.5 years. Since the total number of thermal cycles for the Fuel Transfer Tube Bellows Expansion Joint is less than 7,000 cycles, no reanalysis of the design calculations is necessary. Therefore, an evaluation was performed and was successful in demonstrating that the Fuel Transfer Tube Bellows Expansion Joint design analyses of record remain valid for the period of extended operation.

A.1.2.5 Turbine Rotor Missile Generation Analysis

FSAR Section 3.5.1.3.2, Probability of Turbine Missile Generation, describes a study based upon fracture mechanics that was performed by Westinghouse to obtain a rough estimate of turbine-generator reliability based on expected operating conditions. The number of cycles required to cause an existing crack (flaw) to grow to some larger size was determined. The number of cold start-up cycles, which represent the worst-case stress environment, required by the maximum size undetectable flaw to grow to 1/3 of the critical crack size was calculated to be 140,000. A reasonable upper limit for the number of this type of stress cycle was estimated to be 5 per year or 200 per 40 years plant life. Thus, the maximum undetectable crack poses no threat to the integrity of a turbine-generator possessing the design mechanical properties.

The original analysis estimated 5 cycles per year for 40 years of plant operation. To incorporate the period of extended operation, the estimate of 5 cycles per year was used for 60 years of plant operation. This yielded a value of 300 cycles for 60 years of plant life. The estimated 300 cycles are well below the 140,000 cycles required by the maximum size undetectable flaw to grow to 1/3 of the critical crack size. Therefore, the turbine rotor fracture mechanics analysis of the number of turbine start-up cycles that could result in critical flaw size has been projected to the end of the period of extended operation.

A.1.2.6 Crane Cyclic Load Analysis

Load lifting cranes within the scope of License Renewal have service limitations based upon the number of load cycles they can safely withstand.

The Polar Crane, Jib Cranes, and Reactor Cavity Manipulator Crane in the Containment Building and the Fuel Cask Handling Crane, Fuel Handling Bridge Crane, and Fuel Handling Building Auxiliary Crane in the Fuel Handling Building have been identified as involving 40-year TLAAs for structural fatigue considerations. In support of License Renewal, the cranes have been evaluated for structural fatigue considerations for a 60-year service period. The evaluations are summarized in the following paragraphs.

A.1.2.6.1 Polar Crane

The Polar Crane is a low-cycle lifting device. The total number of load cycles projected for 60-years for the Main Hook is 4,020 and for the Auxiliary Hook is 1,600. The combined total is 5,620 cycles applied to the crane structure. This is below the 20,000 to 100,000 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Polar Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.6.2 Jib Cranes

The Containment Jib Cranes are low load capacity lifting devices used for refueling and maintenance activities. The total number of load cycles projected for 60-years is 18,800. This is less than the 20,000 to 100,000 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Jib Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.6.3 Reactor Cavity Manipulator Crane

The Reactor Cavity Manipulator Crane provides the flexibility to grip, remove, and replace fuel assemblies to support refueling operations. The total number of load cycles projected for 60-years is 16,824. This is less than the 10^7 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Reactor Cavity Manipulator Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.6.4 Fuel Cask Handling Crane

Fuel Cask Handling Crane is a low cycle lifting device. The total number of load cycles projected for 60-years is 8,750. This is less than the 20,000 to 100,000 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Fuel Cask Handling Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.6.5 Fuel Handling Bridge Crane

The Fuel Handling Bridge Crane provides the ability to place, remove, and replace fuel assemblies and appurtenances to support fuel handling operations. The total number of load cycles projected for 60-years is 27,558. This is less than the 10^7 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Fuel Handling Bridge Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.6.6 Fuel Handling Building Auxiliary Crane

The Fuel Handling Building Auxiliary Crane is used to support the refueling process by handling of the removable barrier, pool gates, fuel racks and other miscellaneous items. The total number of load cycles projected for 60-years is 15,380. This is less than the 20,000 to 100,000 permissible cycles originally projected for 40 years and is therefore acceptable. Based on the forgoing, the HNP Fuel Handling Building Auxiliary Crane has been evaluated, and the fatigue analysis has been successfully projected for 60-years.

A.1.2.7 Main and Auxiliary Reservoir Sedimentation Analysis

The Auxiliary Reservoir functions as the ultimate heat sink for HNP, and the Main Reservoir functions as a backup in case the Auxiliary Reservoir is not available. The HNP FSAR addresses sedimentation and concludes that the effects of sediment deposit on the reservoir operations and cooling capacities will be negligible for the current 40-year operating license. Therefore, sedimentation in the Main and Auxiliary Reservoirs at HNP was considered to be a TLAA, since the sedimentation effects are based on a 40-year plant life. A simple calculation of sedimentation based on the ratio of 60 years to 40 years projects values that would have a negligible effect on the capability of the reservoirs. However, HNP intends to use the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Aging Management Program, to manage the potential effects of sedimentation. The Program monitors the Main and Auxiliary Reservoir shoreline, reservoirs, and drainage area for landslides, excessive sedimentation, or developments in the drainage basin that could cause a sudden increase in sediment load, which would reduce the reservoir capacity. The frequency of the inspection of the Auxiliary and Main Reservoirs is every five years. Therefore, the continued implementation of the HNP Regulatory Guide 1.127 Program, will manage the effects of sedimentation in the Main and Auxiliary Reservoirs during the period of extended operation.

A.1.2.8 High Energy Line Break Location Postulation Based on Fatigue Cumulative Usage Factor

Section 3.6 of the FSAR describes the design bases and measures that are taken to demonstrate that the systems, components and structures required to safely shutdown and maintain the reactor in a cold shutdown condition are adequately protected against the effects of blowdown jets, reactive forces, and pipe whip resulting from postulated rupture of piping both inside and outside Containment.

RG 1.46 has been followed in all matters except for the postulation of break points. The criteria of NRC Branch Technical Position MEB 3-1 for Class 1 piping has been adapted such that pipe breaks are postulated to occur at:

a) terminal ends.
b) intermediate locations where the maximum stress range as calculated by Eq. (10) and either (12) or (13) exceeds 2.4 Sm.
c) intermediate locations where the cumulative usage factor exceeds 0.1.

The calculation of cumulative usage factors used design cycles associated with a 40-year design life. Since the design cycles used in these evaluations are associated with a 40-year design life, the high-energy line-break postulation based on cumulative usage factor is considered a TLAA.

Original fatigue design calculations assumed a large number of design transients, corresponding to relatively severe system dynamics over the original 40-year design life. Using the general approach described in A.1.2.2, 60-year fatigue cycle projections have been made for License Renewal. Based on the 60-year cycle projections, the current design fatigue usage factors remained valid for 60 years of operations. Thus, the current cumulative usage factors used for the postulation of break locations in Class 1 lines may be used for the 60 year operating term.

Therefore, fatigue analyses associated with break location postulation for Class 1 lines (excluding the RCS main loop piping) have been determined to remain valid or have been projected to the end or the period of extended operation. In addition, fatigue usage will continue to be monitored during the period of extended operation by the Reactor Coolant Pressure Boundary Fatigue Monitoring Program.

APPENDIX B

AGING MANAGEMENT PROGRAMS

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B.0 AGING MANAGEMENT PROGRAMS

B.1 INTRODUCTION

B.1.1 OVERVIEW

License Renewal aging management program (AMP) 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 AMP discussed in this Appendix has ten (10) program elements. These elements are defined in Appendix A.1, Section A.1.2.3, of NUREG-1800, “Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants,” Rev. 1, U. S. Nuclear Regulatory Commission, September 2005, (the SRP-LR). These elements have been incorporated into the AMPs described in Sections X and XI of NUREG-1801, “Generic Aging Lessons Learned (GALL),” Rev. 1, U.S. Nuclear Regulatory Commission, September 2005, (NUREG-1801). Should an applicant employ plant-specific, non-NUREG-1801, AMPs, SRP-LR guidance would be used to develop a detailed discussion of the 10 elements. However, HNP does not employ any plant-specific AMPs. Therefore, the AMP descriptions in this Appendix implicitly address the ten elements by means of a comparison with the programs in NUREG-1801.

B.1.2 METHOD OF DISCUSSION

For those AMPs that are consistent with the assumptions made in Sections X and XI of NUREG-1801, or are consistent with enhancement, or are consistent with exceptions, each program discussion is presented in the following format:

- A summary description of overall program form and function is provided.
- A statement is made regarding consistency of the program with NUREG-1801.
- Exceptions to the NUREG-1801 program are summarized, and justifications 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 the NUREG-1801 program, are proposed. 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, or will be, effective.

B.1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

Three elements common to all aging management programs are corrective actions, confirmation process, and administrative controls. These elements are included in the HNP Quality Assurance (QA) Program, which implements the requirements of 10 CFR 50, Appendix B. A description of the QA Program is provided in FSAR, Section 17.3.

Corrective Action:

Corrective actions are implemented through the initiation of a Nuclear Condition Report in accordance with procedures established to implement the Corrective Action Management Policy and requirements of 10 CFR 50, Appendix B, Criterion XVI. Conditions adverse to quality, such as, failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to prevent recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management. The Corrective Action Program is consistent with the guidelines in the appendix to Volume 2 of NUREG-1801.

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 and preclude repetition of significant conditions adverse to quality. The Corrective Action Program includes the requirement that measures be taken to preclude repetition of significant conditions adverse to quality. These measures will include actions to verify effective implementation of proposed corrective actions. The confirmation process is part of the corrective action program and, for significant conditions adverse to quality, includes:

- reviews to assure proposed actions are adequate,
- tracking and reporting of open corrective actions,
- root cause determinations, and
- reviews of corrective action effectiveness.

The corrective action 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 investigation with appropriate follow-up corrective action. The HNP confirmation process is consistent with the appendix to Volume 2 of NUREG-1801.

Administrative Controls:

Administrative controls that govern aging management activities are established within the document control procedures that implement: (1) industry standards related to administrative controls and quality assurance for the operational phase of nuclear power plants and (2) the requirements of 10 CFR 50, Appendix B, Criterion VI. The HNP administrative controls process is consistent with the appendix to Volume 2 of NUREG-1801.

B.1.4 OPERATING EXPERIENCE

Industry operating experience (OE) 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 OE was performed to identify aging effects experienced. The review of plant-specific OE involved electronic database searches of plant information. In addition, discussions with system engineers were conducted to identify additional aging concerns.

OE regarding existing programs/activities, 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.

B.1.5 AGING MANAGEMENT PROGRAMS

The AMPs addressed in this Appendix are listed on Table B-1. Information on the table notes whether programs are either existing or new. Each AMP is addressed in the individual Subsections of Section B.2.

B.1.6 TIME-LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS

Table B-1 also includes a listing of AMPs used to resolve Time-Limited Aging Analyses (TLAAs). Evaluation of TLAA-related AMPs in accordance with 10 CFR 54.21(c), are discussed in Section B.3.

B.2 AGING MANAGEMENT PROGRAMS

The correlation between NUREG-1801 programs and HNP AMPs is shown on the following table.

TABLE B-1 CORRELATION OF NUREG-1801 AND HNP AGING MANAGEMENT PROGRAMS

NUREG-1801 Number	NUREG-1801 Program	HNP Program	NUREG-1801 Comparison
		NUREG-1801 Chapter XI	
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program See Subsection B.2.1.	Existing program consistent with NUREG-1801 with exception
XI.M2	Water Chemistry	Water Chemistry Program See Subsection B.2.2.	Existing program consistent with NUREG-1801
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs Program See Subsection B.2.3.	Existing program consistent with NUREG-1801 with exception
XI.M4	BWR Vessel ID Attachment Welds	Not applicable to PWRs.	Not applicable
XI.M5	BWR Feedwater Nozzle	Not applicable to PWRs.	Not applicable
XI.M6	BWR Control Rod Drive Return Line Nozzle	Not applicable to PWRs.	Not applicable
XI.M7	BWR Stress Corrosion Cracking	Not applicable to PWRs.	Not applicable
XI.M8	BWR Penetrations	Not applicable to PWRs.	Not applicable
XI.M9	BWR Vessel Internals	Not applicable to PWRs.	Not applicable
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion Program See Subsection B.2.4.	Existing program consistent with NUREG-1801
XI.M11	Nickel-Alloy Nozzles and Penetrations	Not credited for aging management.	Not applicable; see Note 1
XI.M11A	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program See Subsection B.2.5.	Existing program consistent with NUREG-1801 with enhancement
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Based on a thermal aging susceptibility evaluation, the applicable CASS components are not susceptible to thermal aging.	Not applicable

NUREG-1801 Number	NUREG-1801 Program	HNP Program	NUREG-1801 Comparison
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program See Subsection B.2.6.	New program consistent with NUREG-1801
XI.M14	Loose Part Monitoring	Not credited for aging management.	Not applicable
XI.M15	Neutron Noise Monitoring	Not credited for aging management.	Not applicable
XI.M16	PWR Vessel Internals (no longer an AMP in NUREG-1801, Rev. 1)	Not credited for aging management.	Not applicable; see Note 2
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion Program See Subsection B.2.7.	Existing program consistent with NUREG-1801 with enhancement
XI.M18	Bolting Integrity	Bolting Integrity Program See Subsection B.2.8.	Existing program consistent with NUREG-1801 with exception and enhancement
XI.M19	Steam Generator Tube Integrity	Steam Generator Tube Integrity See Subsection B.2.9.	Existing program consistent with NUREG-1801 with exception and enhancement
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System Program See Subsection B.2.10.	Existing program consistent with NUREG-1801
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System Program See Subsection B.2.11.	Existing program consistent with NUREG-1801 with exception
XI.M22	Boraflex Monitoring	Boraflex Monitoring Program See Subsection B.2.12.	Existing program consistent with NUREG-1801 with enhancement
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Inspection of Overhead Heavy Load and Light Load Handling Systems Program See Subsection B.2.13.	Existing program consistent with NUREG-1801 with enhancement
XI.M24	Compressed Air Monitoring	Not credited for aging management.	Not applicable
XI.M25	BWR Reactor Water Cleanup System	Not applicable to PWRs.	Not applicable
XI.M26	Fire Protection	Fire Protection Program See Subsection B.2.14.	Existing program consistent with NUREG-1801 with enhancement

NUREG-1801 Number	NUREG-1801 Program	HNP Program	NUREG-1801 Comparison
XI.M27	Fire Water System	Fire Water System Program See Subsection B.2.15.	Existing program consistent with NUREG-1801 with enhancement
XI.M28	Buried Piping and Tanks Surveillance	Not credited for aging management.	Not applicable
XI.M29	Aboveground Steel Tanks	Not credited for aging management.	Not applicable
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry Program See Subsection B.2.16.	Existing program consistent with NUREG-1801 with exception and enhancement
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance Program See Subsection B.2.17.	Existing program consistent with NUREG-1801 with enhancement
XI.M32	One-Time Inspection	One-Time Inspection Program See Subsection B.2.18.	New program consistent with NUREG-1801
XI.M33	Selective Leaching of Materials	Selective Leaching of Materials Program See Subsection B.2.19.	New program consistent with NUREG-1801 with exception
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection Program See Subsection B.2.20.	New program consistent with NUREG-1801
XI.M35	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program See Subsection B.2.21.	New program consistent with NUREG-1801 with exception
XI.M36	External Surfaces Monitoring	External Surfaces Monitoring Program See Subsection B.2.22.	Existing program consistent with NUREG-1801 with enhancement
XI.M37	Flux Thimble Tube Inspection	Flux Thimble Tube Inspection Program See Subsection B.2.23.	Existing program consistent with NUREG-1801 with enhancement
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program See Subsection B.2.24.	New program consistent with NUREG-1801
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis Program See Subsection B.2.25.	Existing program consistent with NUREG-1801 with enhancement

NUREG-1801 Number	NUREG-1801 Program	HNP Program	NUREG-1801 Comparison
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE Program See Subsection B.2.26.	Existing program consistent with NUREG-1801 with exception and enhancement
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL Program See Subsection B.2.27.	Existing program consistent with NUREG-1801 with exception
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF Program See Subsection B.2.28.	Existing program consistent with NUREG-1801 with exception
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J Program See Subsection B.2.29.	Existing program consistent with NUREG-1801 with enhancement
XI.S5	Masonry Wall Program	Masonry Wall Program See Subsection B.2.30.	Existing program consistent with NUREG-1801 with enhancement
XI.S6	Structures Monitoring Program	Structures Monitoring Program See Subsection B.2.31.	Existing program consistent with NUREG-1801 with enhancement
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants Program See Subsection B.2.32.	Existing program consistent with NUREG-1801 with enhancement
XI.S8	Protective Coating Monitoring and Maintenance Program	Not credited for aging management.	Not applicable
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program See Subsection B.2.33.	New program consistent with NUREG-1801
XI.E2	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program See Subsection B.2.34.	New program consistent with NUREG-1801
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 Program See Subsection B.2.35.	New program consistent with NUREG-1801

NUREG-1801 Number	NUREG-1801 Program	HNP Program	NUREG-1801 Comparison
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus Program See Subsection B.2.36.	New program consistent with NUREG-1801
XI.E5	Fuse Holders	Not credited for aging management. Insulation for fuse holders is addressed by the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program.	Not applicable
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program See Subsection B.2.37.	New program consistent with NUREG-1801
NUREG-1801 Chapter X			
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Reactor Coolant Pressure Boundary Fatigue Monitoring Program See Subsection B.3.1.	Existing program consistent with NUREG-1801 with enhancement
X.S1	Concrete Containment Tendon Prestress	Not applicable. HNP does not use prestressed tendons in the containment design.	Not applicable
X.E1	Environmental Qualification (EQ) of Electric Components	Environmental Qualification (EQ) Program See Subsection B.3.2.	Existing program consistent with NUREG-1801

Notes:

1. HNP has provided in the FSAR Supplement a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

2. HNP has provided in the FSAR Supplement a commitment to: (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.

B.2.1 ASME SECTION XI, INSERVICE INSPECTION, SUBSECTIONS IWB, IWC AND IWD PROGRAM

Program Description

The American Society of Mechanical Engineers (ASME) Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program consists of periodic volumetric, surface, and/or visual examination, and leakage testing of Class 1, 2, and 3 pressure retaining components and their integral attachments to detect degradation of components and determine appropriate corrective actions. The Program for the Second 10-Year interval at HNP was developed and prepared to meet the ASME Code, Section XI, 1989 Edition (no Addenda).

NUREG-1801 Consistency

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is an existing program consistent with NUREG-1801, Section XI.M1, with exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  NUREG-1801, XI.M1 describes the ASME Section XI, Subsections IWB, IWC and IWD, Inservice Inspection Program as conforming to the requirements of the ASME Code, Section XI, Subsections IWB, IWC and IWD, in the 2001 edition including the 2002 and 2003 Addenda. However, as noted in the description of the NUREG-1801 Section XI.M1 program, 10 CFR 50.55a governs the application of Codes and Standards. In conformance with 10CFR50.55a(g)(4)(ii), the ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified twelve months before the start of the inspection interval. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

Enhancements

None.

Operating Experience

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

A search of Condition Reports and Inservice Inspection (ISI) history, including self-assessments and inspections, was conducted and showed the HNP ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program to be critically monitored, effective, and continually improving. Based on these results, the OE provides evidence that the Program practices are ensuring the continuing integrity of the ISI Class 1, 2, and 3 components.

Conclusion

Implementation of the HNP ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program provides reasonable assurance that applicable aging effects will be managed such that the ISI Class 1, 2, and 3 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.

B.2.2 WATER CHEMISTRY PROGRAM

Program Description

To mitigate aging effects on component surfaces that are exposed to water as process fluid, chemistry programs are used to control water chemistry for impurities (e.g., dissolved oxygen, chlorides, fluorides, and sulfates) that accelerate corrosion and cracking. This program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below the system-specific limits. Alternatively, chemical agents, such as corrosion inhibitors, oxygen scavengers, and biocides, may be introduced to prevent certain aging mechanisms. The HNP Water Chemistry Program is currently based on the latest version of the Electric Power Research Institute (EPRI) guidelines, "Pressurized Water Reactor Primary Water Chemistry Guidelines: Volume 1 and 2, Revision 5," EPRI, Palo Alto, CA, 2003, 1002884, and "Pressurized Water Reactor Secondary Water Chemistry Guidelines – Revision 6," EPRI, Palo Alto, CA: 2004, 1008224. The HNP Water Chemistry Program will be updated as revisions to the guidelines are released.

NUREG-1801 Consistency

The Water Chemistry Program is an existing program that is consistent with NUREG-1801, Section XI.M2.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The EPRI guideline documents have been developed based on plant experience and have been shown to be effective over time with their widespread use in the industry. However, the potential for SCC exists due to inadvertent introduction of contaminants into the primary coolant system from unacceptable levels of contaminants in the boric acid, introduction through the free surface of the spent fuel pool (which can be a natural collector of airborne contaminants), or introduction of oxygen during cooldown. Ingress of demineralizer resins into the primary system has caused IGSCC of Alloy 600 vessel head penetrations. Inadvertent introduction of sodium thiosulfate into the primary system has caused IGSCC of steam generator tubes. The SCC has occurred in safety injection lines, charging pump casing cladding, instrument nozzles in safety injection tanks, and stainless steel piping systems that contain oxygenated, stagnant, or essentially stagnant borated coolant. Steam generator tubes and plugs and Alloy 600 penetrations have experienced primary water stress corrosion cracking. Steam generator tubes have experienced SCC, intergranular attack, wastage, and pitting. Carbon steel support plates in steam generators have experienced general corrosion. The steam generator shell has experienced pitting and stress corrosion cracking.

HNP has reviewed the industry operating experience related to maintenance of a benign environment described in NUREG-1801 to ensure that applicable recommendations have been captured.

A review of SALP (Systematic Assessment of Licensee Performance) reports for the period from 1988 through 1998 was performed with the conclusion that the HNP Water Chemistry Program was well maintained and performed well within regulatory limits. Integrated Inspection Reports reviewed from the period of 1999 through 2006 indicated no adverse trends or violations associated with the HNP Water Chemistry Program.

Progress Energy has performed ten assessments of the HNP Water Chemistry Program from 1997 through 2005. These assessments have identified issues and weaknesses to be addressed. However, these assessments have concluded that the HNP Water Chemistry Program is effective in the support of the Harris Plant.

Nonconformance Reports (NCRs) for the Environmental and Chemistry Unit at HNP were reviewed for the period from January, 2000 to April, 2006. There were approximately 400 NCRs during this time period. These NCRs were searched for items related to chlorides, fluorides, sulfates, oxygen, etc. or programmatic deficiencies. There were instances related to increases in contaminants due to equipment issues (condenser tube leaks, power excursions, valve leaks, etc.). However, trending data for these contaminants indicate that the levels were well below the threshold for age-related degradation.

The HNP Water Chemistry Program is currently based on the latest version of the EPRI guidelines, "Pressurized Water Reactor Primary Water Chemistry Guidelines: Volume 1 and 2, Revision 5," EPRI, Palo Alto, CA: 2003. 1002884, and "Pressurized Water Reactor Secondary Water Chemistry Guidelines – Revision 6," EPRI, Palo Alto, CA: 2004, 1008224. EPRI periodically updates the water chemistry guidelines, as new information becomes available. The HNP Water Chemistry Program will be updated as revisions to the guidelines are released, to develop a more proactive program that minimizes age-related degradation.

The operating experience review of the HNP Water Chemistry Program concluded that this program is continually upgraded based on industry experience and research. These continuous improvements assure the capability of the HNP Water Chemistry Program to support the safe operation of HNP throughout the extended period of operation.

Conclusion

The continued implementation of the HNP Water Chemistry Program provides reasonable assurance that the applicable aging effects will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.3 REACTOR HEAD CLOSURE STUDS PROGRAM

Program Description

The HNP Reactor Head Closure Studs Program is an inspection program which manages cracking and loss of material for the Reactor Vessel Closure Head Stud Assembly. In addition to the condition monitoring elements of the program, the HNP Reactor Head Closure Studs Program includes certain preventive measures recommended by Regulatory Guide (RG) 1.65, "Material and Inspection for Reactor Vessel Closure Studs." This aging management program is implemented primarily through the plant Inservice Inspection (ISI) Program without the need for program enhancements. The Closure Head Stud Assembly comprises the studs and nuts that are inspected under the HNP ISI Program.

The inspection schedule is in accordance with ASME B&PV Code, Section XI, IWB-2400, and the extent and frequency is in accordance with Table IWB-2500-1, Examination Category B-G-1. This will ensure that aging effects will be discovered and repaired before loss of intended function. Examination results are evaluated according to IWB-3100. Acceptance standards are identified in IWB-3400 and IWB-3500. In addition to the examinations performed under the HNP ISI Program, the HNP Reactor Head Closure Studs Program also credits Code required visual VT-2 examinations which are conducted to detect leaks during system pressure or functional tests. Repair and replacement are performed in conformance with the requirements of IWB-4000 and IWB-7000 respectively.

The HNP Reactor Head Closure Studs Program includes inspections that provide reasonable assurance that the effects of cracking and loss of material would be identified prior to loss of intended function. The preventive measures include using a manganese base phosphate coating and avoiding the use of metal-plated stud bolting.

NUREG-1801 Consistency

The HNP Reactor Head Closure Studs Program is an existing program that is consistent with NUREG-1801, Section XI.M3, with an exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  NUREG-1801, Section XI.M3, describes the Reactor Head Closure Studs Aging Management Program as conforming to the requirements of the ASME Code, Section XI, Subsection IWB, 2001 edition, including the 2002 and 2003 Addenda,

Table IWB 2500-1. However, as noted in the description of the NUREG-1801, Section XI.M1, program, 10 CFR 50.55a governs the application of Codes and Standards. In conformance with 10CFR50.55a(g)(4)(ii), the ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified twelve months before the start of the inspection interval. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

Enhancements

None.

Operating Experience

HNP has not identified aging effects for the Reactor Vessel Closure Head Stud Assembly. Therefore, operating experience cannot be used to show program effectiveness.

As identified in NUREG-1801, industry operating experience includes cracking in BWR pressure vessel head studs. NUREG-1801 is based on industry operating experience through January 2005. Recent industry operating experience has been reviewed for applicability and no other industry operating experience has been identified as a result of this review. Any relevant new industry operating experience will be captured through the normal operating experience review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

The HNP Reactor Head Closure Studs Program is a condition monitoring program implemented primarily with the HNP Inservice Inspection Program per the requirements of the ASME Code, Section XI, Subsection IWB and includes certain preventive measures recommended by RG 1.65. Based on the evaluation of this program, there is reasonable assurance that the HNP Reactor Head Closure Studs Program will adequately manage cracking and loss of material for the Reactor Vessel Closure Head Stud Assembly so that applicable intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.4 BORIC ACID CORROSION PROGRAM

Program Description

The Boric Acid Corrosion Program implements systematic measures to ensure that leaking borated coolant does not lead to the degradation of the leakage source or adjacent mechanical, electrical and structural components susceptible to boric acid corrosion. The program consists of: (1) visual inspection of external surfaces that are potentially exposed to borated water leakage, (2) timely discovery of leak path and removal of the boric acid residues, (3) assessment of the damage, and (4) follow-up inspection for adequacy of corrective actions. The Boric Acid Corrosion Program includes plant-specific reactor coolant pressure boundary (RCPB) boric acid leakage identification and inspection procedures to ensure that leaking borated coolant does not lead to degradation of the leakage source or adjacent structures, and provides assurance that the RCPB will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture. The Program was developed in response to the recommendations of NRC Generic Letter 88-05.

NUREG-1801 Consistency

The Boric Acid Corrosion Program is an existing program consistent with NUREG-1801, Section XI.M10.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Boric Acid Corrosion Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Boric Acid Corrosion Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic assessments and review of operating experience; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Boric Acid Corrosion Program; and adequate resources are committed to Program activities.

A review of responses to NRC generic correspondence, plant condition reports, and self-assessments and inspections, was conducted and showed the HNP Boric Acid Corrosion Program to be critically monitored and continually improving. Based on these results, the operating experience review provides evidence that the Boric Acid Corrosion Program practices will continue to assure the integrity of the subject components.

Conclusion

Implementation of the Boric Acid Corrosion Program will provide reasonable assurance that applicable aging effects will be managed such that the components susceptible to boric acid corrosion within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.5 NICKEL-ALLOY PENETRATION NOZZLES WELDED TO THE UPPER REACTOR VESSEL CLOSURE HEADS OF PRESSURIZED WATER REACTORS PROGRAM

Program Description

Since the issuance of NRC Generic Letter 97-01, Progress Energy has been an active participant in industry initiatives relating to Alloy 600 and the specific issue of degradation of Vessel Head Penetration (VHP) nozzles. Since GL 97-01, additional operating experience identified occurrences of circumferential cracking in VHP nozzles. This resulted in the issuance of NRC Bulletin 2001-01 which required HNP to evaluate the VHP nozzles for susceptibility. The HNP response was supported by the PWR Material Reliability Program Response to NRC Bulletin 2001-01 (MRP-48) which identified HNP as a “low” susceptibility plant.

Subsequently, NRC Bulletins 2002-01 and 2002-02 were issued as a result of several cracked and leaking Alloy 600 VHP nozzles within the industry including the degradation of the reactor pressure vessel head at Davis-Besse. In response to the referenced NRC Bulletins, HNP provided additional assurance that the plant programs are adequate to prevent degradation as observed in the industry. Additionally, in response to NRC Bulletin 2002-02, HNP proactively scheduled and performed a 100% bare metal visual inspection of the Reactor Pressure Vessel (RPV) head and Control Rod Drive Mechanism penetrations.

On February 11, 2003, NRC Order EA-03-009 was issued to establish interim inspection requirements for RPV Heads at Pressurized Water Reactors. Subsequently, First Revised NRC Order EA-03-009 was issued on February 20, 2004 to revise certain inspection aspects of the original Order. The Order (as amended) resulted in major changes to the HNP program for managing cracking in the VHP nozzles. The amended Order provided requirements for determining a susceptibility ranking and mandated inspection requirements commensurate with the plant’s susceptibility ranking. As a “low” susceptibility plant, HNP was required by the amended Order to perform a 100% Bare Metal Visual (BMV) inspection of the RPV head surface (including 360° around each penetration nozzle). This inspection was required to be completed at least every third refueling outage or every 5 years, whichever comes first. In keeping with the amended Order, HNP completed the BMV inspection during refueling outage 11. This inspection was observed as a part of an NRC integrated inspection. HNP calculates the susceptibility ranking using the technical method described in the NRC Order (as amended). This susceptibility calculation is updated periodically to incorporate actual operating plant data for each completed plant cycle. The calculation currently projects a “low” susceptibility ranking well into the period of extended operation.

Following Industry Initiative, NEI 03-08, “Guideline for the Management of Materials Issues”, and as mandated by MRP-126, “Generic Guidance for Alloy 600 Management,” HNP committed to develop and document an Alloy 600 management plan. On June 21, 2006, Progress Energy issued Revision 0 of the corporate "Alloy 600 Strategic Plan." Issuance of this document establishes compliance with the mandatory requirement under NEI 03-08 to implement the requirements of MRP-126. This plan will define the processes HNP intends to use to maintain the integrity and operability of each Alloy 600/82/182 component for the remaining life of the plant.

The HNP Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is implemented through the plant ISI Program by the use of augmented inspections.

NUREG-1801 Consistency

The HNP Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program is an existing plant program that, following enhancement, will be consistent with NUREG-1801, Section XI.M11A.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancement will be implemented:

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  The Inservice Inspection Program procedure will be enhanced to include the augmented inspections required by NRC Order EA-03-009 (as amended).

Operating Experience

Although HNP has not identified cracking in the VHP nozzles, HNP has actively participated in the industry response to the issue of cracking in VHP nozzles. HNP has committed to implementing a plant-specific Alloy 600 Management Plan as described in report MRP-126, "Materials Reliability Program Generic Guidance for Alloy 600 Management," Final Report, November 2004. This plan will be based upon industry Alloy 600/82/182 operating experience and will schedule periodic reviews of industry data regarding inspection, repair, mitigation technologies, and lessons learned from industry experience.

Conclusion

Based on the evaluation of the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors Program, there is reasonable assurance that, following implementation of the identified enhancement, the Program will continue to adequately manage cracking in the VHP nozzles so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.6 THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS) PROGRAM

Program Description

The HNP Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will be implemented as an augmented Inservice Inspection (ISI) Program to detect the effects of loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement of CASS reactor vessel internals. These inspections will be performed as augmented inspections to visual inspections already required by American Society of Mechanical Engineers (ASME) Code Section XI, Subsection IWB, Category B-N-3. Components within the scope of this augmented inspection program include CASS reactor vessel internals components that have been determined to be potentially susceptible to thermal aging and/or are subjected to neutron fluence of greater than 10^{17} n/cm^2 (E>1 MeV). Susceptibility to loss of fracture toughness due to thermal embrittlement is determined based on the criteria set forth in the May 19, 2000 letter from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Mr. Douglas Walters, Nuclear Energy Institute (NEI). For components deemed susceptible to loss of fracture toughness due to thermal embrittlement and/or neutron irradiation embrittlement, the program allows for a component-specific evaluation, including a mechanical loading assessment to determine if the loading is compressive or low enough to preclude fracture. The component inspections and/or evaluations must consider the recommendations of NUREG-1801, XI.M13.

The HNP Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will manage loss of fracture toughness due to thermal aging and/or neutron irradiation embrittlement in CASS reactor vessel internals components within the scope of License Renewal such that the system intended function is maintained through the extended period of operation. This program will be implemented and required inspections completed and evaluated during the last 10-year ISI Interval prior to the period of extended operation. Inspections on potentially susceptible components will continue during the period of extended operation.

NUREG-1801 Consistency

The HNP Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program that is consistent with NUREG-1801, Section XI.M13.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

This is a new Aging Management Program for Thermal Aging and Neutron Irradiation Embrittlement of CASS. There is no existing site-specific operating experience to validate the effectiveness of this program at HNP.

NUREG-1801 is based on industry operating experience through January 2005. Recent industry operating experience has been reviewed for applicability. More recent operating experience is captured through the normal operating experience review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

The HNP Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program includes augmented inspections which will be implemented as part of the HNP ISI Program. Augmented inspections on potentially susceptible components will continue during the period of extended operation. Based on the evaluation of this program, there is reasonable assurance that, when implemented, the program will adequately manage loss of fracture toughness so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.7 FLOW-ACCELERATED CORROSION PROGRAM

Program Description

The Flow-Accelerated Corrosion (FAC) Program provides for prediction, detection, and monitoring of FAC in plant piping and other piping components so that timely and appropriate action may be taken to minimize the probability of experiencing a FAC-induced consequential leak or rupture. The FAC Program is based on the guidance provided in NSAC-202L-R2, “Recommendations for an Effective Flow-Accelerated Corrosion Program”, and includes conducting an analysis to determine critical locations, performing limited baseline inspections to determine the extent of thinning at these locations, performing follow-up inspections to confirm the predictions, and repairing or replacing the components as necessary.

NUREG-1801 Consistency

The FAC Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M17.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancement will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  The HNP FAC Program will be enhanced to provide a consolidated exclusion bases document (i.e., a FAC susceptibility analysis). The exclusion bases document will include an evaluation of the Steam Generator Feedwater Nozzles to determine their susceptibility to FAC.

Operating Experience

Nuclear power plants have experienced pipe wall thinning in single-phase and two-phase high-energy piping systems which has been largely attributable to FAC. In response to Generic Letter 89-08, the industry has mounted a broad-based effort to manage this aging mechanism, previously referred to as “erosion-corrosion.” HNP has experienced through-wall leakage in high-energy carbon steel piping; however, there have been no catastrophic failures and the instances of through-wall failures have steadily declined.

The FAC Program has evolved through industry experience and is now described in NSAC-202L-R2. The HNP FAC Program has been effective in its response to both industry and site-specific operating experience and provides an effective means of ensuring the structural integrity of high-energy carbon steel systems. Since inception, the HNP FAC Program has matured and become more effective as a result of program improvements which were based upon self-assessments, independent NRC inspections, site operating experience, and industry operating experience.

The NRC has audited industry programs based on the EPRI methodology at several plants and has determined that these activities can provide a good prediction of the onset of FAC so that timely corrective actions can be undertaken.

Conclusion

Based on the evaluation of the HNP FAC Program, there is reasonable assurance that the program, with the enhancement identified above, will continue to adequately manage the aging effects due to flow-accelerated corrosion so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.8 BOLTING INTEGRITY PROGRAM

Program Description

The Bolting Integrity Program addresses aging management requirements for bolting on mechanical components within the scope of License Renewal. The HNP Bolting Integrity Program utilizes industry recommendations and EPRI guidance that considers material properties, joint/gasket design, chemical control, service requirements, and industry and site operating experience in specifying torque and closure requirements. The program relies on recommendations for a Bolting Integrity Program, as delineated in NUREG-1339, "Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants," and industry recommendations, as delineated in EPRI reports NP-5769, “Degradation and Failure of Bolting in Nuclear Power Plants,” and TR-104213, “Bolted Joint Maintenance & Applications Guide,” for pressure retaining bolting within the scope of License Renewal. Safety related bolting and closures inspections, monitoring/trending, and repair/replacement is performed under the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program. Non-safety related pressure retaining bolting and closures inspection, monitoring, and trending is performed under the External Surfaces Monitoring Program. Degraded conditions are also subject to the Corrective Action Program. The HNP aging management review concluded that no high strength structural bolting is used for NSSS component supports or structures; therefore, this Program does not prescribe aging management requirements for NSSS component support or structural bolting. The Structures Monitoring Program and the ASME Section XI Inservice Inspection, Subsection IWF Program are credited for aging management of structural bolting.

NUREG-1801 Consistency

The Bolting Integrity Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section X1.M18 with exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  NUREG-1801, XI.M1 describes the ASME Section XI, Subsections IWB, IWC and IWD, Inservice Inspection Program as conforming to the requirements of the ASME Code, Section XI, Subsections IWB, IWC and IWD in the 2001 edition including the 2002 and 2003 Addenda. However, as noted in the description of the NUREG-1801 Section XI.M1 program, 10 CFR 50.55a governs the application of Codes and Standards. In conformance with 10CFR50.55a(g)(4)(ii), the ISI Program is updated during each successive 120-month inspection interval

to comply with the requirements of the latest edition and addenda of the Code specified twelve months before the start of the inspection interval. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

- **Detection of Aging Effects**
  See the exception regarding differences in ASME Code edition under Parameters Monitored/Inspected above.

- **Monitoring and Trending**
  See the exception regarding differences in ASME Code edition under Parameters Monitored/Inspected above.

- **Acceptance Criteria**
  See the exception regarding differences in ASME Code edition under Parameters Monitored/Inspected above.

- **Corrective Actions**
  See the exception regarding differences in ASME Code edition under Parameters Monitored/Inspected above.

Enhancements

Prior to the period of extended operation, the below-listed enhancement will be implemented:

<u>Program Elements Affected</u>

- **Preventive Actions**
  The HNP procedure for bolted connections will be revised to prohibit the use of molybdenum disulfide lubricants.

Operating Experience

The OE review shows that the HNP Bolting Integrity Program is continually upgraded based on industry experience, research, and routine program performance. The Program, through its continual improvement, assures the capability of mechanical bolting to support the safe operation of HNP throughout the extended period of operation.

Conclusion

Implementation of the HNP Bolting Integrity Program, with the enhancement identified above, will provide reasonable assurance that aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.9 STEAM GENERATOR TUBE INTEGRITY PROGRAM

Program Description

The Steam Generator Tube Integrity Program is performed as part of the overall Steam Generator Integrity Program. The Steam Generator Tube Integrity Program is credited for aging management of the tubes, tube plugs, tube supports, and the secondary-side components whose failure could prevent the steam generator from fulfilling its intended safety function. The Steam Generator Integrity Program is based on Technical Specification requirements, and meets the intent of NEI 97-06, “Steam Generator Program Guidelines.”

The Steam Generator Tube Integrity Program manages aging effects by providing a balance of prevention, inspection, evaluation, repair, and leakage monitoring. Preventative measures are intended to mitigate degradation related to corrosion phenomena via primary-side and secondary-side water chemistry monitoring and control. Foreign material exclusion requirements are intended to inhibit wear degradation. The Steam Generator Tube Integrity Program provides the actions to be taken in response to finding foreign objects.

The Steam Generator Tube Integrity Program provides the requirements for inspection activities for the detection of flaws in tubing, plugs, tube supports, and secondary-side internal components needed to maintain tube integrity. Degradation assessments identify both potential and existing degradation mechanisms. Inservice inspections (i.e., eddy current testing and visual inspections) are used for the detection of flaws. Condition monitoring compares the inspection results against performance criteria, and an operational assessment provides a prediction of tube conditions to ensure that the performance criteria will not be exceeded during the next operating cycle. Primary-to-secondary leakage is continually monitored during operation.

The steam generators at HNP were replaced in 2001. The new steam generators incorporate significant design improvements, including Alloy 690 thermally-treated tubing, stainless steel tube supports and anti-vibration bars, full-depth hydraulically expanded tubes in the tubesheet, and design features which minimize the deposition of sludge on the tubesheet.

NUREG-1801 Consistency

The Steam Generator Integrity Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M19, with exceptions.

Exceptions to NUREG-1801

Program Elements Affected

- **Scope of Program**
  The Steam Generator Tube Integrity Program has been established to meet the intent of NEI 97-06, "Steam Generator Program Guidelines," Revision 2. NUREG-1801 refers to Revision 1 of NEI 97-06. This is a difference with NUREG-1801. HNP is committed to the implementation of the latest revision of NEI 97-06. The updated NEI 97-06 document incorporates the latest industry operating experience, which strengthens the intent of NEI 97-06 to establish a framework for structuring and strengthening existing steam generator programs. The NRC has not approved NEI 97-06 but recognizes its usefulness as a framework for structuring an effective steam generator program. The NRC stated in NUREG-1801, Section XI.M19, that a licensee's plant Technical Specifications, response to GL 97-06, and commitment to implement the steam generator degradation management program described in NEI 97-06 are adequate to manage the effects of aging on the steam generator tubes, plugs, sleeves, and tube supports. Therefore, use of the latest revision of NEI 97-06 is justified.

- **Preventive Actions**
  The Steam Generator Tube Integrity Program uses a revision of NEI 97-06 that differs from that recommended by NUREG-1801. Refer to the justification under Scope of Program above.

- **Detection of Aging Effects**
  The Steam Generator Tube Integrity Program uses a revision of NEI 97-06 that differs from that recommended by NUREG-1801. Refer to the justification under Scope of Program above.

- **Monitoring and Trending**
  The Steam Generator Tube Integrity Program uses a revision of NEI 97-06 that differs from that recommended by NUREG-1801. Refer to the justification under Scope of Program above.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  Enhance the Program implementing procedure to require that degraded tube plugs and secondary side components (e.g., tube supports) are evaluated for corrective actions.

- **Parameters Monitored/Inspected**
  Enhance the Program implementing procedure to require that degraded tube plugs and secondary side components (e.g., tube supports) are evaluated for corrective actions.

- **Corrective Actions**
  Enhance the Program implementing procedure to require that degraded tube plugs and secondary side components (e.g., tube supports) are evaluated for corrective actions.

Operating Experience

The Steam Generator Integrity Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program meets regulatory, process, and procedure requirements; that qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and that adequate resources are committed to Program activities.

The Steam Generator Integrity Program utilizes operating experience to promote the identification and transfer of lessons learned from both internal and industry events so that the knowledge gained can be used to improve nuclear plant safety and operations. Operating experience provides the methodology for receiving, processing, status reporting, screening, reviewing, evaluating, and taking preventive and corrective actions in response to operating experience information.

A review of industry operating history showed that operating experience of the HNP replacement steam generators is similar to that of other replacement steam generators with thermally-treated Alloy 690 tubes and design enhancements which minimize the likelihood of degradation. There have been no reported instances of cracking in thermally-treated Alloy 690 tubes at any U.S. plants; the only indications to date are from wear (fretting) due to loose parts, tube supports, antivibration bars, and manufacturing or handling anomalies.

A review of plant-specific condition reports, internal and external assessments, and operating history was conducted and showed the Steam Generator Integrity Program to be critically monitored, effective in maintaining tube integrity, and continually improving.

The overall effectiveness of the Steam Generator Integrity Program is supported by the operating experience for systems, structures, and components; no tube integrity-related degradation has resulted in loss of component intended function.

Conclusion

Continued use of the Steam Generator Tube Integrity Program, as implemented by the Steam Generator Integrity Program and following implementation of the enhancements identified above, will provide reasonable assurance that applicable aging effects are managed such that the steam generator components/commodities within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.10 OPEN-CYCLE COOLING WATER SYSTEM PROGRAM

Program Description

The HNP Open-Cycle Cooling Water System Program relies on implementation of the recommendations in the NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," and the guidance in its supplement, Generic Letter 89-13, Supplement 1, to ensure that the effects of aging on the Open-Cycle Cooling Water (OCCW) systems will be managed for the extended period of operation. The Program includes surveillance and control techniques to manage aging effects caused by biofouling, corrosion, erosion, and silting in the OCCW systems or structures and components serviced by the OCCW systems.

The OCCW System Program addresses the Emergency Service Water (ESW) System and the safety related portion of the Normal Service Water (NSW) System (i.e., piping and components associated with its containment isolation). The Program scope includes safety related components and flow paths in the ESW and NSW Systems that are subjected to a raw water environment.

NUREG-1801 Consistency

The OCCW System Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M20.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

A review of recent system operating history shows that the OCCW System Program has been effective in identifying and mitigating leaks, as well as preventing equipment failures related to fouling and flow blockage. A review of plant and industry operating experience has identified the following aging effects and/or mechanisms: (a) localized pin-hole leakage; (b) erosion of system components, e.g., pumps and pump discharge strainers; (c) corrosion; (d) flow blockage in small-bore, stagnant lines due to silting and corrosion products; (d) partial blockage from silting in cooling header to the diesel jacket water coolers; and (e) minor amounts of biological organisms and silt deposits in the intake bays. Heat exchanger fouling due to manganese deposits has been identified in system heat exchangers at HNP. Chemistry control measures have been initiated, e.g., adding manganese dispersants, and have ameliorated this concern to a large extent. These measures are still part of the on-going inspections and cleaning efforts that are part of this program. Requirements for addressing these issues are formalized in the OCCW System Program and these items are included in the Correction Action Program.

Conclusion

Continued use of the OCCW System Program will provide reasonable assurance that the aging effects will be managed such that the applicable components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.11 CLOSED-CYCLE COOLING WATER SYSTEM PROGRAM

Program Description

The Closed-Cycle Cooling Water System Program addresses aging management of components in the Component Cooling Water and Essential Services Chilled Water Systems and components in other systems cooled by these systems. This program also manages the jacket water components associated with the Emergency Diesel Generators, Diesel Driven Fire Pump, and Security Diesel. These systems are closed cooling loops with controlled chemistry, consistent with the NUREG-1801 description of a closed cycle cooling water system. This Program relies on maintenance of system corrosion inhibitor concentrations within specified limits of "Closed Cooling Water Chemistry Guideline: Revision 1 to TR-107396, Closed Cooling Water Chemistry Guideline," EPRI, Palo Alto, CA: 2004, 1007820, to minimize corrosion. Surveillance testing and inspection in accordance with standards in the EPRI report for closed-cycle cooling water (CCCW) systems is performed to evaluate system and component performance. These measures will ensure that the CCCW system and components serviced by the CCCW system are performing their functions acceptably.

NUREG-1801 Consistency

The Closed-Cycle Cooling Water System Program is an existing program consistent with NUREG-1801, Section XI.M21, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Preventive Action**
  The Closed-Cycle Cooling Water System Program currently uses the 2004 version of the EPRI Closed Cooling Water Chemistry Guideline. However, NUREG-1801 references the 1997 version. This is acceptable because EPRI incorporates new information to develop proactive plant-specific water chemistry programs to minimize corrosion and periodically updates the water chemistry guidelines as new information becomes available. As revisions to the guidelines are released, the Program will be updated to develop a more proactive program that minimizes age-related degradation.

- **Parameters Monitored/Inspected**
  Some heat exchangers are not monitored for flow, inlet and outlet temperatures, and differential pressure. In these cases, either the functionality of these heat exchangers is verified by activities outside the Closed-Cycle Cooling Water

Program or the specific operating conditions of the heat exchanger render performance testing unreliable.

- **Detection of Aging Effects**
  Some heat exchangers that are not normally in operation are not periodically tested to ensure operability. However, the functionality of these heat exchangers is verified by activities outside the Closed-Cycle Cooling Water Program.

Enhancements

None.

Operating Experience

An OE review found no evidence of age-related degradation for components wetted by the HNP CCCW Systems. Degradation of components that interface with the Service Water System, such as heat exchanger tubes, has been experienced.

The OE review shows that the Closed-Cycle Cooling Water Program is continually upgraded based on industry experience, external and internal assessments, and routine program performance, and has provided an effective means of mitigating loss of material, cracking, and reduction of heat transfer effectiveness.

Conclusion

The continued implementation of the HNP Closed-Cycle Cooling Water System Program provides reasonable assurance that the aging effects will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.12 BORAFLEX MONITORING PROGRAM

Program Description

The Boraflex Monitoring Program is implemented to assure that no unexpected degradation of the Boraflex neutron absorbing material would compromise the criticality analysis for spent fuel storage racks. The criticality analysis for Pressurized Water Reactor spent fuel racks contained in pools A and B currently reflects a zero Boraflex credit. HNP plans to perform new criticality analysis to eliminate credit for Boraflex in the Boiling Water Reactor spent fuel racks. Until such time as this analysis has been completed and approved by the NRC, the Boraflex Monitoring Program will continue to be implemented. The Program relies on periodic inspection, testing and analysis of test coupons and monitoring of silicon levels to assure that the required 5% subcriticality margin is maintained. Corrective actions are initiated if the test results find that the 5% subcriticality margin cannot be maintained because of current or projected future Boraflex degradation.

NUREG-1801 Consistency

The Boraflex Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M22.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Preventive Action**
  1) The Boraflex Monitoring Program will be enhanced to include measurements of actual boron areal density using in-situ techniques.

  2) The HNP Boraflex Monitoring Program will be enhanced to include neutron attenuation testing (“blackness testing”), to determine gap formation in Boraflex panels.

  3) The HNP Boraflex Monitoring Program will be enhanced to include the use of EPRI RACKLIFE predictive code or its equivalent.

- **Parameters Monitored/Inspected**
  The Boraflex Monitoring Program will be enhanced to include measurements of actual boron areal density using in-situ techniques.

- **Detection of Aging Effects**
  The three enhancements listed for the Preventive Action element above also are applicable to Detection of Aging Effects.

Operating Experience

NUREG-1801 is based on industry operating experience through January 2005. Recent industry operating experience since the issuance of NUREG-1801 has been reviewed for applicability. HNP has used predictive codes (e.g., RACKLIFE) to confirm data determined from testing of surveillance coupons and silica trend data. In addition, operating experience is captured on an ongoing basis through the normal operating experience review process.

Conclusion

Implementation of the Boraflex Monitoring Program, with the enhancements identified above, will provide reasonable assurance that applicable aging effects will be managed such that the Boraflex in the spent fuel racks will continue to perform its intended functions consistent with the CLB for the period of extended operation.

B.2.13 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD HANDLING SYSTEMS PROGRAM

Program Description

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program provides for the inspection of the following cranes:

Structure	Cranes
Containment Building	Polar Crane, Reactor Cavity Manipulator Crane, and Jib Cranes
Fuel Handling Building	Fuel Handling Bridge Crane, Fuel Cask Handling Crane, and Fuel Handling Building Auxiliary Crane

The inspections monitor structural members for the absence of signs of corrosion other than minor surface corrosion and crane rails for abnormal wear. The inspections are performed annually for the Fuel Handling Building cranes, and every fuel cycle for the Containment Building cranes. Other monorail structures located in in-scope structures do not credit this Program for aging management activities, because they are addressed as structural steel and managed under the Structures Monitoring Program.

NUREG-1801 Consistency

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M23.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  Revise administrative controls to include all cranes that are within the scope of License Renewal.

- **Parameters Monitored/Inspected**
  Revise administrative controls to require notification of the responsible engineer of unsatisfactory inspection results.

- **Detection of Aging Effects**
  Revise administrative controls to address the following: (1) to include the Containment Reactor Cavity Manipulator Crane within the scope of License Renewal, (2) specify an annual inspection frequency for the Fuel Cask Handling Crane, Fuel Handling Bridge Crane, and Fuel Handling Building Auxiliary Crane, and every refuel cycle for the Polar Crane, Jib Cranes, and Reactor Cavity Manipulator Crane, and (3) include requirements to inspect for bent or damaged members, loose bolts/components, broken welds, abnormal wear of rails, and corrosion (other than minor surface corrosion) of steel members and connections.

Operating Experience

Based on review of plant history, HNP has identified issues involving missing and loose crane components, crane operation anomalies, industry issues, crane manufacturer recommendations, periodic inspections, and regulatory compliance through the corrective action process. Even though there has been no evidence of corrosion or wear reported for the cranes, these aging effects have been found for other carbon steel components for similar environments and, therefore, will still require aging management. Crane monitoring programs are continually being upgraded based upon industry and Progress Energy plant experience. The results of this intrusive and proactive approach to the operation and management of cranes validate the effectiveness of those procedures used to implement the Inspection of Overhead Heavy Load and Light Load Handling Systems Program. Based on these results, operating experience provides evidence that the Inspection of Overhead Heavy Load and Light Load Handling Systems Program practices are ensuring the continuing integrity of the subject License Renewal cranes.

Conclusion

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program, with the enhancements identified above, will provide reasonable assurance that the aging effects of corrosion of structural components and crane rail wear are adequately managed so that the intended functions of cranes within the scope of License Renewal are maintained during the period of extended operation.

B.2.14 FIRE PROTECTION PROGRAM

Program Description

The HNP Fire Protection Program provides aging management of the diesel-driven fire pump fuel oil supply line and credited fire barrier assemblies including fire doors, penetration seals, fire wrap, barrier walls, barrier ceilings and floors, and seismic joint filler. The program is implemented through various plant procedures and will effectively manage the aging effects associated with the subject components such that the intended functions of applicable components will be maintained through the period of extended operation.

HNP relies on water-based fixed fire suppression systems to meet the fire protection requirements of 10 CFR 50.48. NUREG-1801 mentions fixed suppression systems that use carbon dioxide and Halon. Carbon dioxide systems are not used at HNP for fire protection. A Halon 1301 extinguishing system is provided for the record storage facility located in the Administration Building outside the protected area. However, this Halon system is not needed to comply with the requirements of 10 CFR 50.48. In addition, a foam suppression system is used to protect the Auxiliary Boiler Fuel Oil Tanks, which are isolated from and over 500 feet from any Class 1 structure and those structures directly related to power production. The foam suppression system is not needed to comply with the requirements of 10 CFR 50.48. HNP also uses distributed portable fire extinguishing equipment containing halon and carbon dioxide in various areas to protect safety-related equipment. These portable extinguishers do not require an aging management program because they were treated as short lived equipment that is periodically inspected and replaced as required. Aging management of the water-based fixed fire suppression systems is addressed by the Fire Water System Program in Subsection B.2.15.

NUREG-1801 Consistency

The HNP Fire Protection Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M26.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  Refer to the enhancements below which necessarily affect the scope of the Program.

- **Parameters Monitored/Inspected**
  1) The HNP Fire Protection Program procedure for periodic inspections of penetration seals will be enhanced to include inspections for signs of degradation as described in NUREG-1801, Section XI.M26, for this program element. This will include requirements to inspect for cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals, which are directly caused by increased hardness, and shrinkage of seal material due to weathering.

  2) The HNP Fire Protection Program will be enhanced to include a periodic test procedure for inspections of barrier walls, ceilings, and floors on at least an 18-month interval. Visual inspections of the fire barrier walls, ceilings, and floors will examine any sign of degradation such as cracking, spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates. The enhanced procedure will include requirements for notification, restoration, and mitigating actions if any fire barrier wall, ceiling or floor fails to meet the acceptance criteria.

  3) The Program operability test procedure for the diesel-driven fire pump will be enhanced to include a visual inspection of the insulated fuel oil supply piping for signs of leakage.

- **Detection of Aging Effects**
  1) The program enhancements described above under the Parameters Monitored/Inspected program element are necessary for consistency with this program element.

  2) The periodic inspection procedures for penetration seals, fire doors, and the diesel-driven fire pump will be enhanced to include minimum qualification requirements for fire protection qualified inspectors.

  3) The periodic inspection procedures for fire wrap will be enhanced to include minimum qualification requirements for fire protection qualified inspectors.

- **Monitoring and Trending**
  The program enhancements described above under the Parameters Monitored/Inspected program element are necessary for consistency with this program element.

- **Acceptance Criteria**
  The program enhancements described above under the Parameters Monitored/Inspected program element are necessary for consistency with this program element.

- **Operating Experience**
  The program enhancements described above under the Detection of Aging Effects program element are necessary for consistency with this program element.

Operating Experience

The Fire Protection Program is maintained in accordance with HNP engineering program requirements and managed in accordance with plant administrative controls. The operating history and assessment results for the Program show it is an effective means of ensuring the preservation from fire of the safe shutdown capability of HNP. The HNP Fire Protection Program is continually improving based on both industry and plant-specific operating experience. Industry operating experience is incorporated into the Fire Protection Program via the Operating Experience Program and as a result of NRC generic communications. The HNP Program benefits from benchmarking other Progress Energy plants as well as other industry plants. Plant-specific operating experience is also used to improve the Fire Protection Program through use of the Corrective Action Program and program assessments.

Conclusion

Continued implementation of the Fire Protection Program, including the enhancements identified above, will provide reasonable assurance that applicable aging effects will be managed such that fire protection features will continue to perform applicable intended functions consistent with the CLB for the period of extended operation.

B.2.15 FIRE WATER SYSTEM PROGRAM

Program Description

The Fire Water System Program includes system pressure monitoring, wall thickness evaluations, periodic flow and pressure testing in accordance with applicable NFPA commitments and periodic visual inspection of overall system condition. These activities provide an effective means to determine whether corrosion and biofouling are occurring. Inspections of sprinkler heads assure that corrosion products that could block flow of the sprinkler heads are not accumulating. These measures will allow timely corrective action in the event of system degradation to ensure the capability of the water-based Fire Suppression System to perform its intended function.

NUREG-1801 Consistency

The Fire Water System Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M27.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Parameters Monitored/Inspected**
  Revise the Program to incorporate a requirement to perform non-intrusive baseline pipe thickness measurements at various locations, prior to the expiration of current license and trended through the period of extended operation. The plant-specific inspection intervals will be determined by engineering evaluation performed after each inspection of the fire protection piping to detect degradation prior to the loss of intended function.

- **Detection of Aging Effects**
  1) Refer to the Program revision identified under Parameters Monitored/Inspected above.

  2) HNP will either replace the sprinkler heads prior to reaching their 50 year service life or revise site procedures to perform field service testing of

representative samples from one or more sample areas by a recognized testing laboratory.

- **Monitoring and Trending**
  Refer to the Program revision identified under Parameters Monitored/Inspected above.

- **Acceptance Criteria**
  Refer to the Program revision identified under Parameters Monitored/Inspected above.

Operating Experience

The Fire Water System Program is maintained in accordance with HNP engineering programs requirements. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers, and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities. The operating history and assessment results for the Fire Water System Program show it is an effective means of ensuring the preservation from fire of the safe shutdown capability of HNP. Since these measures assure continual improvement of the Program as prompted by industry experience and research and routine program performance, the capability of the Program to support the safe operation of HNP throughout the extended period of operation is therefore assured.

Conclusion

Continued implementation of the HNP Fire Water System Program, including the enhancements identified above, will assure that the components/commodities associated with the water-based Fire Suppression System will perform their intended functions for the period of extended operation.

B.2.16 FUEL OIL CHEMISTRY PROGRAM

Program Description

Fuel oil quality is maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines of the American Society for Testing Materials (ASTM) Standard D1796 (as referenced in ASTM D975-81), D2276-78, and D4057-81. HNP applies the 1983 version of D1796. The ASTM standards are in accordance with the HNP Technical Specification Surveillance Requirements for fuel oil testing. In accordance with industry best practices, HNP performs periodic testing to detect the presence of biological growth. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by verifying the quality of new oil and adding stabilizers before its introduction into the storage tanks and by periodic sampling to assure that the tanks are free of water, particulates, and biological growth. The effectiveness of the program is verified by periodic tank inspections to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.

NUREG-1801 Consistency

The Fuel Oil Chemistry Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M30, with exceptions.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  1) In addition to the aging mechanisms listed in NUREG-1801, the HNP Fuel Oil Chemistry Program is credited with managing loss of material due to crevice corrosion. The NUREG-1801 program lists loss of material due to general, pitting, and microbiologically-influenced corrosion. This exception is considered acceptable since the environment causing crevice corrosion is similar to the environment that causes pitting corrosion and their monitoring and inspection techniques are the same.

  2) In addition to storage tanks, the program is used to manage aging effects on all in-scope system components “wetted” by fuel oil. This exception results in additional materials being in scope beyond those in the NUREG-1801 and is considered to be an exception. Because the quality of fuel oil in contact with these surfaces is being controlled in the supply tanks by control of its chemistry or by design features, the aging management benefits of the program are also provided to these additional materials.

- **Preventive Actions**
  1) None of the systems in scope of this program use corrosion inhibitors. Site operating experience does not show adverse trends in corrosion in the fuel oil components. Therefore, corrosion inhibitors are not required.

  2) The penetrations for the drain line in the Emergency Diesel Generator day tanks enter the tanks horizontally resulting in water and sediment, if present, remaining on the bottom of the tanks. The day tanks are in the Diesel Generator Building, which has its own HVAC system and, therefore, would not be subject to large temperature swings causing condensation. Frequent checks for water are performed as a result of Technical Specification Surveillance Requirements. The tanks are periodically cleaned to minimize corrosion and biological growth.

  3) The Security Power System diesel engine (day) tank is sampled at the inlet filter to the engine, which is installed at an elevation above the tank's outlet nozzle. The outlet nozzle is located horizontally at the bottom of the tank. Thus, sediment and water may accumulate there. Periodic water removal is not performed. During periodic inspection of the tank removal of water and sediment will be performed, as practical, given its limited access.

  4) The use of stabilizers in diesel-driven fire pump fuel oil tank is not warranted, as fuel oil is frequently refreshed. The consumption of fuel oil is the result of the monthly requirement in Fire Protection Program to run the pump for 30 minutes on relief flow. The frequent addition of diesel fuel oil eliminates the need for stabilizers.

- **Parameters Monitored/Inspected**
  HNP uses the guidance in ASTM D 2276-78, Method A, without modification for filter pore size. The filter used is a smaller pore size. Since a filter with a smaller pore size traps more particulates than the one with a larger pore size, this test provides more conservative results than the one recommended by NUREG-1801. Therefore, this exception is acceptable.

- **Detection of Aging Effects**
  1) Multi-level sampling is not performed in the main fuel oil storage tanks, as recommended for the larger fuel oil tanks used in the Petroleum Industry. Discretion is used at nuclear plants where significantly smaller tanks are used for storage and are not subject to the same degree of heterogeneity. This exception is acceptable because at HNP the main storage tank samples are obtained so they would result in conservative values for bulk average fuel oil quality.

  2) An exception is taken regarding ultrasonic testing of the Security Power System diesel engine fuel oil tanks. Ultrasonic thickness measurements would

only be done for the buried main tank and the (day) tank if visual inspection reveals significant internal damage due to loss of material. For the (day) tank, this exception is acceptable, because if there is no visible damage on the internal surfaces and none found during inspections of the outside surfaces per the External Surfaces Monitoring Program, then there is no compelling reason to perform ultrasonic testing. The buried tank is designed as a double-walled tank where the interstitial area can be monitored for leakage. The outside surface has a polyurethane epoxy coating made of a Fiber-Reinforced Polyester (FRP). The FRP material is effectively resistant to degradation in the soil. Therefore, if there is no internal surface damage there is no reason to perform ultrasonic testing.

3) An exception is taken regarding ultrasonic testing of the diesel-driven fire pump fuel oil tank. Ultrasonic thickness measurements would only be done for the tank if visual inspection reveals significant internal damage due to loss of material or limited access makes visual inspection unacceptable. This insulated tank is above ground and its external surfaces monitored by the External Surfaces Monitoring Program. If there is no significant exterior or interior corrosion identified then there is no reason to perform ultrasonic testing.

- **Monitoring and Trending**
  1) Monitoring and trending for biological growth (e.g. microorganisms and algae) in the fuel oil contained within the Diesel Fuel Oil Storage Tank Building tanks will be performed semiannually not quarterly. This exception is justified by site operating experience showing there has been no biological growth detected.

  2) The Security Power System buried tank and (day) tank are monitored semiannually, not quarterly. This exception is acceptable because operating experience shows no evidence of corrosion or biological growth since the installation of the new tanks and use of the Diesel Grade No 1-D. This period covers over ten years of operating experience. If Diesel No. 2-D is used in the future, the monitoring, except for biological growth, will be performed on quarterly basis for the main storage tank only. (Note: Replacement of the buried tank was done to comply with more stringent state and federal codes for buried fuel oil tanks.)

  3) Testing for biological growth (e.g. microorganisms and algae) in the diesel-driven fire pump fuel oil tank will be performed semiannually not quarterly. This exception is justified by site operating experience showing there has been no biological growth detected.

- **Acceptance Criteria**
  See the exceptions regarding evaluation of the ASTM Standards described above under Parameters Monitored/Inspected.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  Enhance the monitoring procedure for the diesel-driven fire pump fuel oil tank by checking for and removing accumulated water and adding particulate analysis. These activities will be performed quarterly. Additionally, biological growth testing will be added and performed semiannually.

- **Preventive Actions**
  1) Develop a work activity to periodically clean and inspect the Security Power System buried fuel tank and (day) tank. Prior to inspection, fuel, water, and sediment will be removed as practical given the limited access in the tank. UT or other NDE will be performed if inspection proves inadequate or indeterminate.

  2) Revise the chemistry sampling procedure for the diesel-driven fire pump fuel oil tank to identify the corrective actions to be taken if a positive result is obtained for biological growth. The appropriate course of action should be taken after the amount and type of biological growth is quantified. The use of biocides will be included as one alternative.

  3) Develop a work activity to inspect the diesel-driven fire pump fuel oil tank. Prior to the inspection, remove fuel, water, and sediment as practical due to the limited access. UT or other NDE will be performed if inspection proves inadequate or indeterminate.

  4) Develop a work activity to periodically check and remove water from the bottom of the diesel-driven fire pump fuel oil tank.

- **Detection of Aging Effects**
  1) Prior to the period of extended operation and as part of the One-Time Inspection Program, ultrasonic thickness measurements will be taken and compared with previous measurements to confirm the effectiveness of the program in preventing loss of material of the internal surfaces of the Diesel Fuel Oil Storage Tank Building tank liners.

  2) Refer to the enhancements for cleaning and inspecting the Security Power System buried fuel tank and (day) tank discussed under Preventive Actions above.

3) Refer to the enhancements for cleaning and draining water from the diesel-driven fire pump fuel oil tank discussed under Preventive Actions above.

- **Monitoring and Trending**
  1) Revise the Fuel Oil Chemistry Program procedure to require, at least semiannually, monitoring and trending of bacterial growth in the fuel oil contained in the Diesel Fuel Oil Storage Tank Building tanks and semiannual monitoring and trending of particulate contamination and water and sediment in the Emergency Diesel Generator Fuel Oil Day Tanks.

  2) For the Emergency Diesel Fuel Oil Day Tanks, establish an appropriate sample point , e.g., in the drain line or pump suction line upstream of piping components such as a filter or pump, and incorporate it into the sampling procedure.

  3) Revise the program procedure to require, at least semiannually, monitoring and trending of bacterial growth in the fuel oil contained in the Security Diesel System buried fuel oil tank. Add a requirement to perform quarterly monitoring and trending for water and sediment and particulates if diesel fuel oil Grade No. 2-D is used.

  4) Revise the program procedure to require, at least semiannually, monitoring of bacterial growth in the fuel oil contained in the diesel-driven fire pump fuel oil tank, and at least quarterly, monitoring and trending of particulate contamination with appropriate administrative limits. Additionally, for the storage tank, perform quarterly checks for water using the bottom drain line.

- **Corrective Actions**
  A nuclear condition report will be initiated for trending purposes when an administrative limit is exceeded for water and sediment, particulates, biological growth or when water is drained from a tank. Based on the judgment of the responsible personnel, a nuclear condition report of higher priority may be initiated that requires the cause to be determined and actions to be taken to prevent recurrence. Additionally, where the program does not specify administrative limits for water and sediment and particulates, appropriate values will be established.

Operating Experience

The Fuel Oil Chemistry Program is implemented and maintained in accordance with the general requirements for the HNP Environmental and Chemistry Sampling and Analysis Program. This provides assurance that the Fuel Oil Chemistry Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic assessments, and review of operating experience.

A review of plant condition reports, chemistry results since 2000 for the parameters available, and the 10-year EDG Fuel Oil Storage Tank Liner inspection results demonstrate that the HNP Fuel Oil Chemistry Program is critically monitored and continually improving. Based on these results, the Operating Experience review provides evidence that the Fuel Oil Chemistry Program practices have thus far ensured the integrity of the subject components.

Conclusion

With the addition of the proposed enhancements, the Fuel Oil Chemistry Program will provide reasonable assurance that aging effects will be managed such that the applicable components will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.17 REACTOR VESSEL SURVEILLANCE PROGRAM

Program Description

The Reactor Vessel Surveillance Program manages the reduction of fracture toughness of the reactor vessel beltline materials due to neutron embrittlement. The program fulfills the intent and scope of 10 CFR 50, Appendix H. The program evaluates neutron embrittlement by projecting upper-shelf energy (USE) for all reactor materials with projected neutron exposure greater than 10^{17} n/cm^2 (E>1.0 MeV) after 60 years of operation and with the development of pressure-temperature limit curves. Embrittlement information is obtained in accordance with RG 1.99, Rev. 2 chemistry tables and with surveillance capsules, which have provided credible data during the current operating period and are expected to provide additional data for the period of extended operation. The surveillance program design, capsule withdrawal schedule, and evaluation of test results are in accordance with ASTM E 185-82. As capsules are withdrawn from the reactor vessel, tested specimens are stored for future reconstitution, if needed. The program manages the remaining capsules so that withdrawal of one capsule will occur when the capsule fluence is equivalent to the 60-year maximum vessel fluence. The two remaining capsules will be managed to optimize neutron exposure and provide meaningful metallurgical data if additional license renewals are sought. The program manages the steps taken if reactor vessel exposure conditions are altered, such as the review and updating of 60-year fluence projections to support the preparation of new pressure-temperature limit curves and pressurized thermal shock reference temperature calculations.

NUREG-1801 Consistency

The HNP Reactor Vessel Surveillance Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M31.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Program Element 4**
  Revise the program to indicate that tested and untested specimens from all capsules pulled from the reactor vessel since plant startup must be kept in

storage to permit future reconstitution use. The identity, traceability, and recovery of the capsule specimens shall be maintained throughout testing and storage.

- **Program Element 6**
  1) Revise the program to indicate that withdrawal of the next capsule will occur during Refueling Outage (RFO)-16, which is the outage immediately following the operating cycle in which the capsule fluence is equivalent to the 60-year maximum vessel fluence.

  2) Revise the program to indicate that HNP will evaluate neutron exposure for the remaining capsules, based on the analysis of the capsule withdrawn during RFO-16. The neutron exposure and withdrawal schedule for the capsules remaining after RFO-16 will be optimized to provide meaningful metallurgical data. If a capsule is projected to significantly exceed a meaningful fluence value, it will either be relocated to a lower flux position, or withdrawn for possible future testing or reinsertion. The remaining capsules and archived test specimens available for reconstitution will be available for the monitoring of neutron exposure if additional license renewals are sought.

- **Program Element 8**
  Revise the program to indicate that, if future plant operations exceed the limitations or bounds in Section 1.3 of NRC Regulatory Guide 1.99, Revision 2, or the applicable bounds, e.g., cold leg operating temperature and neutron fluence, as applied to the surveillance capsules, the impact of these plant operation changes on the extent of reactor vessel embrittlement will be evaluated, and the NRC will be notified.

Operating Experience

The Reactor Vessel Surveillance Program is described in FSAR Section 5.3 and has provided materials data and dosimetry for the monitoring of irradiation embrittlement since plant startup. The use of program has been reviewed and approved by the NRC during the period of current operation. A review of NRC Information Notices, Bulletins, and Generic Letters, and the INPO operating experience database was performed, but no applicable OE items were identified that relate to reactor vessel surveillance events since January 2005. Surveillance capsules have been withdrawn during the period of current operation, and the credible data from these surveillance capsules have been used to verify and predict the performance of HNP reactor vessel beltline materials with respect to neutron embrittlement. Calculations have been performed as required to project the degree of reduction in USE that is expected to result from projected neutron exposure in the future, including 60-year projections. Pressure/temperature limits have been imposed on operational parameters at HNP to assure that the vessel is operated within required safety margins. Three capsules remain inside the reactor vessel, exposed to additional neutron flux, providing a source for future data that will be used to manage neutron embrittlement aging effects for the period of extended operation.

Conclusion

The continued implementation of the Reactor Vessel Surveillance Program, with the enhancements identified above, will provide reasonable assurance that neutron embrittlement aging effects will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.2.18 ONE-TIME INSPECTION PROGRAM

Program Description

The One-Time Inspection Program uses one-time inspections to verify the effectiveness of an aging management program and confirm the absence of an aging effect. The Program includes inspections specified by NUREG-1801, as well as plant-specific inspections where inspection results can reasonably be extrapolated through the period of extended operation. The One-Time Inspection Program is credited for aging management of various structures/components at HNP as shown below:

Structure/Component	Building Structure/ System	Aging Effect of Concern
Various components that credit the Water Chemistry Program for aging management. (One-time inspection to verify the effectiveness of the Water Chemistry Program)	Reactor Vessel and Internals, Pressurizer, Chemical and Volume Control, Boron Thermal Re-generation, Low Head Safety Injection and RHR, Gross Failed Fuel Detection, Primary Sampling, Post-Accident Sampling, Steam Dump, Steam Generator, Steam Generator Blowdown, Main Steam Supply, Auxiliary Boiler/Steam, Feedwater, Auxiliary Feedwater, Auxiliary Steam Condensate, Condensate, Condensate Storage, Secondary Sampling, Turbine, Demineralized Water, Radiation Monitoring, Radwaste Sampling, and Refueling Systems	Loss of Material, Cracking, Reduction of Heat Transfer Effectiveness
Various components that credit the Fuel Oil Chemistry Program for aging management. (One-time inspection to verify the effectiveness of the Fuel Oil Chemistry Program)	Diesel Generator Fuel Oil Storage and Transfer, Security Power, and Fire Protection Systems	Loss of Material
Various components that credit the Lubricating Oil Analysis Program for aging management. (One-time inspection to verify the effectiveness of the Lubricating Oil Analysis Program)	Reactor Coolant Pump and Motor, Chemical and Volume Control, Boron Thermal Regeneration, Main Steam Supply, Auxiliary Feedwater, Essential Services Chilled Water, Emergency Diesel Generator, Diesel Generator Lubrication, Security Power, Fire Protection, and Secondary Waste Treatment Systems	Loss of Material, Cracking, Reduction of Heat Transfer Effectiveness, Change in Material Properties
Piping Components	Boron Thermal Regeneration	Loss of Material due to corrosion

Structure/Component	Building Structure/ System	Aging Effect of Concern
Piping Components and Refueling Water Storage Tank	Containment Spray	Loss of Material due to corrosion
Steam generator feedwater impingement plate and support	Steam Generator	Loss of Material due to erosion
Feedwater distribution ring and supports	Steam Generator	Loss of Material due to flow accelerated corrosion
Piping Components	Steam Generator Chemical Addition	Loss of Material due to corrosion
Piping Components	Steam Generator Wet Lay Up	Loss of Material due to corrosion, Cracking due to stress corrosion cracking
Piping Components	Potable and Sanitary Water	Loss of Material due to corrosion
Piping Components	Spent Fuel Cask Decontamination and Spray	Loss of Material due to corrosion
Piping Components	Penetration Pressurization	Loss of Material due to corrosion
Retaining Wall Buried Tie-Rods	Outside the Power Block Structures	Loss of Material

Degraded conditions will be addressed per the requirements of the Corrective Action Program.

NUREG-1801 Consistency

The One-Time Inspection Program is a new Program that is consistent with NUREG-1801, Section XI.M32.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The One-Time Inspection Program is a new program. The HNP aging management review process ensures that one-time inspections have been prescribed and developed with consideration of plant and industry operating experience.

Conclusion

The implementation of the One-Time Inspection Program provides reasonable assurance that aging effects will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent through the period of extended operation.

B.2.19 SELECTIVE LEACHING OF MATERIALS PROGRAM

Program Description

The Selective Leaching of Materials Program ensures the integrity of components and/or commodities (such as piping, pump casings, valve bodies and heat exchanger components) made of copper alloys with zinc content greater than 15% and gray cast iron exposed to a raw water, treated water, lubricating oil or hydraulic fluid, fuel oil, wetted air/gas or soil environment at HNP. A new inspection procedure will define one time examination methodology and acceptance criteria. The Program will be implemented by the work management process using a qualitative determination of selected components that may be susceptible to selective leaching. Confirmation of selective leaching may be performed with a metallurgical evaluation or other testing methods.

The examinations will determine whether loss of material due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function(s) for the period of extended operation. A sample population will be selected for the inspections which will be completed prior to commencing the period of extended operation. Evidence suggesting the presence of selective leaching will result in expanded sampling as appropriate and engineering evaluation.

NUREG-1801 Consistency

The Selective Leaching of Materials Program is a new program consistent with NUREG-1801, Section XI.M33, with an exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  The exception involves the use of examinations, other than Brinell hardness testing identified in NUREG-1801, to identify the presence of selective leaching. A qualitative determination of selective leaching will be used in lieu of Brinell hardness testing for components within the scope of this program. The exception is justified, because (1) Brinell hardness testing may not be feasible for most components due to form and configuration (i.e., heat exchanger tubes) and (2) other mechanical means, i.e., scraping, or chipping, provide an equally valid method of identification.

- **Parameters Monitored/Inspected**
  A qualitative determination of selective leaching will be used in lieu of Brinell

hardness testing for components within the scope of this program. Refer to the discussion of this exception under the Scope of Program element above.

- **Detection of Aging Effects**
  A qualitative determination of selective leaching will be used in lieu of Brinell hardness testing for components within the scope of this program. Refer to the discussion of this exception under the Scope of Program element above.

Enhancements

None.

Operating Experience

The Selective Leaching of Materials Program is a new program; therefore, operating experience to verify the effectiveness of the program is not available. A review of plant-specific operating experience has identified no occurrences of selective leaching of materials.

Conclusion

Implementation of the Selective Leaching of Materials Program will provide reasonable assurance that the aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.20 BURIED PIPING AND TANKS INSPECTION PROGRAM

Program Description

The Buried Piping and Tanks Inspection Program will manage aging effects on the external surfaces of carbon steel and cast iron piping components that are buried in soil. There are no buried tanks in the program. The aging effects/mechanisms of concern are loss of material due to general, pitting and crevice corrosion and MIC. To manage the aging effects, this Program includes (a) preventive measures to mitigate degradation (e.g. coatings and wrappings required by design), and (b) visual inspections of external surfaces of buried piping components, when excavated, for evidence of coating damage and degradation. The Program will manage aging effects on the external surfaces of carbon steel and gray cast iron piping components that are buried in soil or sand. To manage the aging effects, this Program includes (a) preventive measures to mitigate degradation (e.g. coatings and wrappings), and (b) visual inspections of external surfaces of buried piping components for evidence of coating damage and degradation.

Detailed procedural requirements for the Program will be developed and will include provisions to (1) incorporate a requirement to ensure an appropriate as-found pipe coating and material condition inspection is performed whenever buried piping within the scope of this Program is exposed, with a minimum frequency of at least one buried piping inspection each 10 years, (2) require an initial inspection within the 10-year period prior to the period of extended operation, (3) specify that an inspection checklist will be developed, (4) require inspection results to be documented, (5) add precautions concerning excavation and use of backfill to the excavation procedure to include precautions for License Renewal piping, (6) add a requirement that buried piping coating inspection shall be performed, when excavated, by qualified personnel to assess its condition, and (7) add a requirement that a coating engineer or other qualified individual (such as the Coatings Program Manager) should assist in evaluation of any buried piping coating damage and/or degradation found during the inspection.

Any evidence of damage to the coating or wrapping, such as perforations, holidays or other damage will cause the protected components to be inspected for evidence of loss of material. The Program assures that the effects of aging on buried piping components are being effectively managed for the period of extended operation.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection Program is a new program that is consistent with NUREG-1801, Section XI.M34.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

Industry operating experience has shown that carbon steel and cast iron buried components have experienced corrosion degradation. Critical areas include those at the interface where the component transitions from above ground to below ground. This is an area where coatings are often missing or damaged.

Leaks have occurred in HNP buried piping components and been repaired, which demonstrates that leaks have been detected and that appropriate corrective actions have been taken to ensure no loss of component intended function in the period of extended operation.

Based on plant operating experience, periodic excavations of buried piping for inspection will not be specified; however, a minimum frequency of at least one buried piping inspection each 10 years will be required. The Buried Piping and Tanks Inspection Program is a new program; therefore, operating experience to verify the effectiveness of the program is not available. As additional operating experience is obtained, lessons learned may be used to adjust this program.

Conclusion

Implementation of the Buried Piping and Tanks Inspection Program provides reasonable assurance that the aging effect of loss of material due to corrosion mechanisms will be managed such that systems and components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.21 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL-BORE PIPING PROGRAM

Program Description

The industry has experienced cracking of small-bore piping as the result of thermal and mechanical loading and intergranular stress corrosion. Specific industry identified events include cracking caused by fatigue due to thermal stratification which resulted in the issuance of NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant System," (as supplemented). The ASME Code does not currently require volumetric examination of Class 1 small-bore piping. However, as stated in NUREG-1801, Section XI.M35, the NRC believes that the inspection of small-bore Class 1 piping (less than NPS 4) should include volumetric examinations to identify cracking. The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will manage this aging effect through the use of volumetric examinations with the exception that volumetric examinations for small-bore socket-welds will not be done. In lieu of performing volumetric inspections of socket welds, the program will include one-time volumetric examinations of a sample of Class 1 butt welds for pipe less than NPS 4. The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will manage cracking in small-bore piping (less than NPS 4) such that the system intended function is maintained and loss of RCS pressure boundary does not occur through the extended period of operation. This program will be implemented and inspections completed and evaluated prior to the period of extended operation.

NUREG-1801 Consistency

The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping is a new program that is consistent with NUREG-1801, Section XI.M35 with exception.

Exceptions to NUREG-1801

Program Elements Affected

- **Detection of Aging Effects**
  The HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will manage this aging effect through the use of volumetric examinations with the exception that volumetric examinations for small-bore socket-welds will not be done. The current state of technology provides no effective, reliable method of performing volumetric examinations of small-bore socket welds. In lieu of performing volumetric inspections of socket welds, the program will include one-time volumetric examinations of a sample of Class 1 butt welds for pipe less than NPS 4. The sample population for the volumetric inspections will be at least 10% or will otherwise be based on a risk-informed

inspection plan approved by the NRC. The volumetric inspections will be completed prior to the end of, and within the last five years of, the current operating period. In addition, the program will include controls to ensure that 100% of all ASME Class 1 socket welds NPS 2 and smaller receive a VT-2 visual inspection each refueling outage in accordance with the approved ASME Section XI ISI program. Any cracking identified in small-bore Class 1 piping determined to be attributable to stress corrosion or thermal and mechanical loading will result in periodic inspections.

- **Monitoring and Trending**
  Refer to the exception identified under Detection of Aging Effects above.

Enhancements

None.

Operating Experience

This is a new aging management program for the One-Time Inspection of ASME Code Class 1 Small-Bore Piping. There is no existing operating experience to validate the effectiveness of this program. Any future operating experience which may impact the program will be captured through the normal operating experience review process where it is screened for applicability. This process will continue through the period of extended operation.

Conclusion

Based on this evaluation, there is reasonable assurance that, when implemented, the HNP One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program will adequately manage cracking in small-bore Class 1 piping so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.22 EXTERNAL SURFACES MONITORING PROGRAM

Program Description

The External Surfaces Monitoring Program is based on system inspections and walkdowns. This program consists of periodic visual inspections of components such as piping, piping components, ducting, and other equipment within the scope of License Renewal and subject to aging management review in order to manage aging effects. The External Surfaces Monitoring Program includes inspections and evaluations performed by engineering personnel. The program directs thorough and consistent inspection of SSCs, using inspection criteria that focus on detection of aging effects. The program manages aging effects through visual inspection of external surfaces. Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion Program. Surfaces that are inaccessible during plant operations are inspected during refueling outages. Surfaces that are inaccessible during both plant operations and refueling outages are inspected at frequencies to provide reasonable assurance that effect of aging will be managed such that applicable components will perform their intended function during the period of extended operation.

NUREG-1801 Consistency

The External Surfaces Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M36.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  A specific list of systems managed by the program will be added to the program document. Specific guidance will be provided for insulated/jacketed pipe and piping components to evaluate the integrity of the covering for signs of leakage and the environmental conditions (moist/wet) to determine whether insulation should be removed to inspect for corrosion.

- **Detection of Aging Effects**
  1) Components and structures of the system that are inaccessible or not readily

visible during both plant operations and refueling outages are to be inspected at such intervals that would provide reasonable assurance that the effects of aging will be managed such that applicable components will perform their intended function during the period of extended operation.

2) Specific guidance will be provided for visual inspections of elastomers for cracking, chafing, or changes in material properties due to wear.

- **Acceptance Criteria**
  The program will incorporate a checklist for evaluating inspection findings, with qualified dispositions. The program will define when corrective action is required. Unacceptable findings will have a condition report initiated and will be handled under the Corrective Action Program.

Operating Experience

System inspection requirements that have been in effect at HNP have proved to be effective in maintaining the material condition of plant systems. A significant number of corrective actions have been processed as a result of system engineer walkdowns. The External Surfaces Monitoring Program will be re-assessed and upgraded based on industry and plant specific operating experience reviews.

Conclusion

Implementation of the External Surfaces Monitoring Program, with the enhancements identified above, will provide reasonable assurance that the aging effects will be adequately managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.23 FLUX THIMBLE TUBE INSPECTION PROGRAM

Program Description

Industry experience with thimble tube thinning resulted in issuance of NRC Bulletin 88-09, “Thimble Tube Thinning in Westinghouse Reactors.” In response to the NRC Bulletin, HNP has established a Flux Thimble Tube Inspection Program to monitor for thinning of the flux thimble tube walls. The program uses eddy current testing to monitor for wear. Plant-specific test results are evaluated to determine the wear rate using the methodology outlined in WCAP-12866, “Bottom Mounted Instrumentation Flux Thimble Wear.” Once the wear rate has been established, wear predictions are calculated using the WCAP-12866 methodology. The wear predictions are then used to determine an adequate inspection frequency. The acceptance criteria used to identify unacceptable flux thimbles includes an allowance to account for instrument inaccuracies. The HNP Flux Thimble Tube Inspection Program manages loss of material due to wear so that the system intended function is maintained and loss of RCS pressure boundary does not occur through the extended period of operation.

NUREG-1801 Consistency

The HNP Flux Thimble Tube Inspection Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M37.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Monitoring and Trending**
  1) Subsequent to each inspection, the latest test results will be evaluated against the historical test results in order to determine a plant-specific value for “n” (wear curve exponent). If the generic value of 0.67 is used for “n”, a basis must be provided for using the generic value in lieu of plant-specific data.

  2) The program engineer may deem it unnecessary to perform a 100% inspection of all uncapped flux thimbles during each scheduled inspection. Such a decision may be due to thimbles that have been recently replaced or thimbles that are in locations with historically low wear rates. Since plant specific test data

is necessary to determine wear rates used to predict future wear, the Program procedure is to be revised to require an evaluation and basis for each flux thimble not inspected.

3) Plant-specific test data should be used to validate the wear curve exponent. The Program procedure is to be revised to require an assessment of actual test results to determine if the assumed wear rate is conservative. This includes a comparison of the actual test results with the predicted wear.

- **Acceptance Criteria**
  1) The procedure governing the Program does not directly address the requirements for test results showing an actual wear depth of greater than 70%. However, it requires replacement or isolation of any thimble not meeting the acceptance criteria. Therefore, the procedure indirectly requires any thimble with over 70% wear to be replaced or isolated. In order to clarify this requirement, the acceptance criteria of the procedure should be changed to require replacement or capping for any thimble with actual wear greater than 70% (instead of 80%).

  2) The Program procedure currently states that thimbles which have a predicted wear of less than 70% "are acceptable for another fuel cycle operation." This suggests that evaluation may only consider inspection frequencies of one fuel cycle (18 months). This requirement should be re-worded to state that thimbles meeting this criterion "are acceptable until the next scheduled inspection".

- **Corrective Action**
  1) Add a requirement to provide a disposition and basis for thimbles that could not be inspected due to restriction, defect or other reason. Thimbles which cannot be shown by analysis to be satisfactory for continued service must be removed from service and replaced or capped to ensure the integrity of the reactor coolant system pressure boundary.

  2) Add a requirement for test results and evaluations of test results to be sent to Document Services to be filed as QA records.

Operating Experience

Industry experience with thimble tube thinning was initially communicated from the NRC by Information Notice 87-44, "Thimble Tube Thinning in Westinghouse Reactors" (as supplemented), and NRC Bulletin 88-09.

As stated in the IE Bulletin 88-09 and in NUREG-1801, Section XI.M37, "the only effective method for determining thimble tube integrity is through inspections which are adjusted to account for plant-specific wear patterns and history." Therefore, the HNP

Flux Thimble Tube Inspection Program focuses on plant-specific wear data rather than industry data.

The HNP Flux Thimble Inspection program does not rely on preventive measures to manage the effects of wear. Wear is expected to occur and is managed by monitoring and taking actions to prevent loss of the RCS pressure boundary. As a result of performing flux thimble inspections, several thimbles have been replaced. Based on a search of corrective action items and discussion with the program engineer, there has been no history of through wall leaks of flux thimbles at HNP.

Conclusion

Based on the evaluation of the HNP Flux Thimble Tube Inspection Program, there is reasonable assurance that the program, with planned enhancements, will continue to adequately manage the aging effect of flux thimble wear so that system intended functions will be maintained consistent with the CLB for the period of extended operation.

B.2.24 INSPECTION OF INTERNAL SURFACES IN MISCELLANEOUS PIPING AND DUCTING COMPONENTS PROGRAM

Program Description

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program will be implemented via existing predictive maintenance, preventive maintenance, surveillance testing, and periodic testing work order tasks that provide opportunities for the visual inspection of internal surfaces of piping, piping elements, ducting, and components. Periodic internal inspections of components allow timely detection of component degradation and determination of appropriate corrective actions. The Program work activities will monitor parameters that may be detected by visual inspection and include change in material properties, cracking, flow blockage, loss of material, and reduction of heat transfer effectiveness. The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions.

NUREG-1801 Consistency

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program consistent with NUREG-1801, Section XI.M38.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is a new program for which there is no operating experience. The Inspection of Internal Surfaces Program will be implemented via existing predictive maintenance, preventive maintenance, surveillance testing and periodic testing work order tasks. Such tasks have been in place at HNP since the plant began operation. These activities have proven effective at maintaining the material condition of systems, structures, and components and detecting unsatisfactory conditions. System Engineers review operating experience for possible impact to the equipment in their systems. The basis for parameters monitored and inspection intervals is based on vendor recommendations, historical performance, and industry wide operating experience. Operating experience is disseminated and evaluated as described in the Operating Experience Program.

Conclusion

Implementation of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program provides reasonable assurance that applicable aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.25 LUBRICATING OIL ANALYSIS PROGRAM

Program Description

The purpose of the Lubricating Oil Analysis Program is to ensure the oil environment in mechanical systems is maintained to the required quality. The Lubricating Oil Analysis Program maintains oil system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking, or reduction of heat transfer. Lubricating oil testing activities include sampling and analysis of lubricating oil for detrimental contaminants.

NUREG-1801 Consistency

The Lubricating Oil Analysis Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M39.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Parameters Monitored/Inspected**
  1) Ensure by revising program control and implementing documents as needed that used oil from appropriate component types listed in the scope of License Renewal are analyzed to determine particle count and moisture, and if oil is not changed in accordance with the component manufacturer's recommendation, then additional analyses for viscosity, neutralization number, and flash point will be performed. During oil changes, used oil is drained and visually checked for water. This is done to detect evidence of abnormal wear rates, contamination by moisture, or corrosion.

  2) Program procedures will be enhanced to include a requirement to perform ferrography or elemental analysis to identify wear particles or products of corrosion when particle count exceeds an established level or when considered appropriate.

Operating Experience

A review of site operating history over a 10-year period and a review of operating experience data between 1999 and 2005 were performed. No instances of failures attributed to lubricating oil contamination have been identified. The Lubricating Oil Analysis Program has been effective at managing aging effects for components wetted by lubricating oil. The program has been improved through evaluation of site and industry operating experience.

Conclusion

Following implementation of the enhancements identified above, implementation of the Lubricating Oil Analysis Program will provide reasonable assurance that applicable aging effects will be managed such that the applicable components will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.26 ASME SECTION XI, SUBSECTION IWE PROGRAM

Program Description

The ASME Section XI, Subsection IWE Program consists of periodic inspections of Class MC components of the containment structure. The Program is in accordance with the ASME Code, Section XI, Subsection IWE, 1992 Edition, with the 1992 Addenda, as modified by 10CFR50.55a. The ASME Section XI, Subsection IWE Program is credited for the aging management of the:

1. Metallic liner (including its integral attachments) for the concrete containment,
2. Penetration sleeves including the personnel airlock, emergency airlock, and equipment hatch,
3. Pressure retaining bolted connections within the boundary of the concrete containment vessel, and
4. Seals, gaskets, and moisture barriers.

The primary inspection method for the ASME Section XI, Subsection IWE Program is periodic visual examination along with limited volumetric examinations utilizing ultrasonic thickness measurements as needed.

NUREG-1801 Consistency

The ASME Section XI Subsection IWE Program is an existing program that, after the below listed enhancements are completed, will be consistent with NUREG-1801, Section XI.S1, with exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  NUREG-1801, Section XI.S1, describes the ASME Section XI Subsection IWE Program as conforming to the requirements of ASME Section XI Subsection IWE, 2001 edition including the 2002 and 2003 Addenda. The current HNP ASME Section XI, Subsection IWE program plan for the First Ten-Year inspection interval defined from September 9, 1998 to September 8, 2008, approved per 10 CFR 50.55a, is based on ASME Section XI Subsection IWE, 1992 edition with 1992 Addenda. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Parameters Monitored/Inspected**
  1) Revise administrative controls to include discoloration, surface discontinuities and other signs of surface irregularities as recordable conditions for coated and uncoated surfaces.

  2) Revise administrative controls to include moisture barriers and parameters identified by Table IWE-2500-1 for Category E-D for aging effects of wear, damage, erosion, tear, surface cracks, or other defects that may violate the leak-tight integrity.

  3) Revise administrative controls to include pressure retaining bolting parameters identified by Table IWE-2500-1 for Category E-G for visual inspection and bolt torque or tension test.

  4) Revise administrative controls to discuss augmented examinations per IWE-1240 and inspections identified by Table IWE-2500-1 for Category E-C.

- **Acceptance Criteria**
  The four enhancements identified above under Parameters Monitored/Inspected are applicable to Acceptance Criteria also.

Operating Experience

The ASME Section XI, Subsection IWE Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Plant-specific operating experience has identified numerous assessments, performed on both a plant-specific and corporate basis, dealing with program development, effectiveness, and implementation. The HNP IWE Program is continually being upgraded based upon industry and plant-specific experience. Additionally, plant operating experiences are shared between Progress Energy sites through regular peer group meetings, a common corporate sponsor, and outage participation of program managers from other Progress Energy sites.

Conclusion

Implementation of the ASME Section XI, Subsection IWE Program, with enhancements identified above, will provide reasonable assurance that the aging effects of pressure retaining Containment Structure Class MC components are adequately managed so that the intended functions of the applicable components will be maintained during the period of extended operation.

B.2.27 ASME SECTION XI, SUBSECTION IWL PROGRAM

Program Description

The ASME Section XI, Subsection IWL Program consists of periodic visual inspection of reinforced concrete containment structures. The Program is in accordance with ASME Code, Section XI, Subsection IWL, 1992 Edition, 1992 Addenda, and is credited for the aging management of accessible and inaccessible, pressure retaining, primary containment concrete. The HNP concrete containments do not utilize a post-tensioning system; therefore, the IWL requirements associated with a post-tensioning system are not applicable.

NUREG-1801 Consistency

The ASME Section XI Subsection IWL Program is an existing program consistent with NUREG-1801, Section XI.S2, with exception.

Exceptions to NUREG-1801

Program Elements Affected

- **Scope of Program**
  NUREG-1801, XI.S2 describes the ASME Section XI Subsection IWL Program as conforming to the requirements of ASME Section XI Subsection IWL, 1992 edition with the 2001 edition including the 2002 and 2003 Addenda. The current HNP ASME Section XI, Subsection IWL program plan for the First Ten-Year inspection interval defined from September 9, 1998 to September 8, 2008, approved per 10 CFR 50.55a, is based on ASME Section XI, Subsection IWL, 1992 edition, with 1992 Addenda. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

Enhancements

None.

Operating Experience

The ASME Section XI, Subsection IWL Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Plant-specific OE has identified numerous assessments, performed on both a plant-specific and corporate basis, dealing with Program development, effectiveness, and implementation. The HNP ASME Section XI, Subsection IWL Program is continually being upgraded based upon industry and plant-specific experience. Additionally, plant OE is shared between Progress Energy sites through regular peer group meetings, a common corporate sponsor, and outage participation of program managers from other Progress Energy sites.

Conclusion

The ASME Section XI, Subsection IWL Program provides reasonable assurance that the aging effects of pressure retaining Primary Containment concrete are adequately managed so that the intended functions of the concrete will be maintained during the period of extended operation.

B.2.28 ASME SECTION XI, SUBSECTION IWF PROGRAM

Program Description

The HNP ASME Section XI, Subsection IWF Program provides for visual examination of component and piping supports within the scope of License Renewal for loss of material and loss of mechanical function. The program is implemented through plant procedures, which provide for visual examination of ISI Class 1, 2, and 3 supports. Visual examination is provided in accordance with the requirements of ASME Section XI, Subsection IWF, 1989 Edition with no Addenda (89 Code) and ASME Code Case N-491-2 for component supports other than snubbers. For the snubber attachments and their fasteners, inspections are provided in accordance with Technical Specifications. The applicable code for the snubber attachments and fasteners is the 1995 Edition with 1996 Addenda of the ASME OM Code and ASME OM Code Case OMN-13.

NUREG-1801 Consistency

The HNP ASME Section XI, Subsection IWF Program is an existing Program consistent with NUREG-1801, Section XI.S3, with exception.

Exceptions to NUREG-1801

<u>Program Elements Affected</u>

- **Scope of Program**
  NUREG-1801, Section XI.S3, describes the ASME Section XI Subsection IWF Program as conforming to the requirements of ASME Section XI Subsection IWF, 2001 edition including the 2002 and 2003 Addenda. The current HNP ASME Section XI, Subsection IWF program plan for the second ten-year interval defined from February 2, 1998 through May 1, 2007, approved per 10 CFR50.55a, for components and supports is based on ASME Section XI Subsection IWF, 1989 Edition (no Addenda). Snubber attachments and fasteners are based on the 1995 Edition with 1996 Addenda of the ASME OM Code and ASME OM Code Case OMN-13. In conformance with 10 CFR 50.55a(g)(4)(ii), the ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified twelve months before the start of the inspection interval. The difference between the HNP Code of record and the Code edition specified in NUREG-1801 is considered to be an exception to NUREG-1801 criteria.

- **Parameters Monitored/Inspected**
  The exception identified above under Scope of Program is applicable to this element also.

Enhancements

None.

Operating Experience

The ASME Section XI, Subsection IWF Program is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Plant-specific operating experience has identified numerous assessments, performed on both a plant-specific and corporate basis, dealing with program development, effectiveness, and implementation. The HNP IWF Program is continually being upgraded based upon industry and plant specific experience. Additionally, plant operating experiences are shared between Progress Energy sites through regular peer group meetings, a common corporate sponsor, and outage participation of program managers from other Progress Energy sites.

Conclusion

Continued implementation of the HNP ASME Section XI, Subsection IWF Program provides reasonable assurance that the aging effects will be managed such that the components/commodities within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.29 10 CFR PART 50, APPENDIX J PROGRAM

Program Description

The 10 CFR Part 50, Appendix J Program is structured in accordance with the requirements of 10 CFR 50, Appendix J, and assures the required performance-based leak testing of the containment and its penetrations. The Program consists of monitoring of leakage rates through containment liner/welds, penetrations, fittings, and access openings to detect degradation of the pressure boundary. Corrective actions are taken if leakage rates exceed acceptance criteria. The Program is the acceptable method for verifying, through testing, the management of aging effects for containment integrity as documented in NUREG-1801, Chapter II. The 10 CFR Part 50, Appendix J Program is applicable to the leakage testing portion of aging management for the HNP containment and its penetrations. For Integrated Leak Rate Testing, the Program is in accordance with Option B (performance based leak testing) of 10 CFR 50, Appendix J and the guidelines contained in Regulatory Guide 1.163, September 1995, and NEI 94-01, "Industry Guideline for Implementing Performance Based Option of 10 CFR Part 50, Appendix J". For Local Leak Rate Testing, the Program is in accordance with the prescriptive requirements of 10 CFR Part 50, Appendix J Option A, for Type B and Type C tests.

NUREG-1801 Consistency

The 10 CFR Part 50, Appendix J Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S4.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancement will be implemented:

<u>Program Elements Affected</u>

- **Corrective Actions**
  Administrative controls that implement the Program will be revised to describe the evaluation and corrective actions to be taken when leakage rates do not meet their specified acceptance criteria.

Operating Experience

The 10 CFR Part 50, Appendix J Program is maintained in accordance with the general requirements for engineering programs. This provides assurance that the Program is effectively implemented to meet regulatory, process, and procedure requirements, including periodic reviews; qualified personnel are assigned as program managers and are given authority and responsibility to implement the Program; and adequate resources are committed to Program activities.

Based on review of operating history, corrective actions, and self-assessments, the 10 CFR Part 50, Appendix J Program is continually monitored and enhanced to incorporate the results of OE; as such it provides an effective means of ensuring the structural integrity and leak tightness of the HNP containment.

Conclusion

Following program enhancement, continued implementation of the 10 CFR Part 50, Appendix J Program will provide reasonable assurance that applicable aging effects will be managed such that the components/commodities within the scope of this Program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.30 MASONRY WALL PROGRAM

Program Description

The objective of the Masonry Wall Program is to manage aging effects so that the evaluation basis established for each masonry wall within the scope of License Renewal remains valid through the period of extended operation. The program includes masonry walls identified as performing intended functions in accordance with 10 CFR 54.4. Included walls are the masonry walls within the Containment Building, Reactor Auxiliary Building, Diesel Generator Building, Fuel Handling Building, HVAC Equipment Room, Security Building, Tank Area/Building, Turbine Building, and the Waste Processing Building. The Program is a condition monitoring program with the inspection frequencies established such that no loss of intended function would occur between inspections.

NUREG-1801 Consistency

The Masonry Wall Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S5.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  Revise Program administrative controls to identify the structures that have masonry walls in the scope of License Renewal.

Operating Experience

The Masonry Wall Program is implemented through a corporate procedure which provides systematic measures to ensure the objectives of the Masonry Wall Program manage aging effects so that the evaluation basis established for each masonry wall within the scope of License Renewal remains valid through the period of extended operation. The Masonry Wall Program is included within the scope of the Maintenance Rule Program which is implemented and maintained in accordance with the general requirements for engineering programs. This provides assurance that the Masonry Wall

Program is effectively implemented to meet regulatory, process, and procedural requirements, including periodic reviews; qualified personnel are assigned as program managers, and are given the authority and responsibility to implement the Masonry Wall Program; and adequate resources are committed to Program activities.

Inspections, as documented in structure walkdown inspection reports and NRC inspection reports, and assessments, as documented in self-assessments and NAS assessments, have been conducted and show the Masonry Wall Program as implemented through the Maintenance Rule Program to be critically monitored and continually improving. Based on these results, the Operating Experience provides evidence that the Masonry Wall Program activities are ensuring the continuing integrity of the subject walls.

Conclusion

The continued implementation of the Masonry Wall Program, with enhancements identified above, will provide reasonable assurance that applicable aging effects are adequately managed so that the intended functions of masonry walls within the scope of License Renewal are maintained during the period of extended operation.

B.2.31 STRUCTURES MONITORING PROGRAM

Program Description

The Structures Monitoring Program manages the aging effects of civil/structural commodities within the scope of License Renewal. The Structures Monitoring Program is implemented, through procedures, in accordance with the regulatory requirements and guidance associated with the Maintenance Rule, 10 CFR50.65; NRC Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Rev. 2, and Nuclear Energy Institute (NEI) 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Rev. 2. The Program incorporates criteria recommended by the Institute for Nuclear Power Operations (INPO) Good Practice document 85-033, "Use of System Engineers;" NEI 96-03, "Guidelines for Monitoring the Condition of Structures at Nuclear Plants," and inspection guidance based on industry experience and recommendations from American Concrete Institute Standard ACI 349.3R-96, "Evaluation of Existing Nuclear Safety-Related Concrete Structures;" and American Society of Civil Engineers, ASCE 11-90, "Guideline for Structural Condition Assessment of Existing Buildings." The Program consists of periodic inspection and monitoring of the condition of structures and structure component supports to ensure that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined.

NUREG-1801 Consistency

The Structures Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S6.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

<u>Program Elements Affected</u>

- **Scope of Program**
  Administrative controls that implement the program will be revised to:
  1) Specifically identify the License Renewal structures and systems that credit the Program for aging management.
  2) Require notification of the responsible engineer when below-grade concrete is exposed so an inspection may be performed prior to backfilling.

3) Require periodic groundwater chemistry monitoring including consideration for potential seasonal variations.
4) Define the term “structures of a system” in the system walkdown procedure and specify the condition monitoring parameters that apply to "structures of a system."
5) Include the corporate structures monitoring procedure as a reference in the plant implementing procedures and specify that forms from the corporate procedure be used for inspections.
6) Require inspection of inaccessible surfaces of concrete pipe when exposed.

- **Parameters Monitored/Inspected**
  Administrative controls that implement the Program will be revised to:
  1) Identify additional civil/structural commodities and associated inspection attributes required for License Renewal.
  2) Require notification of the responsible engineer when below-grade concrete is exposed so an inspection may be performed prior to backfilling.
  3) Require inspection of inaccessible surfaces of concrete pipe when exposed.

Operating Experience

The Structures Monitoring Program incorporates best practices recommended by the Institute of Nuclear Power Operations and inspection guidance based on industry experience and recommendations from the American Concrete Institute and the American Society of Civil Engineers.

A review of inspection reports, self-assessments, and condition reports has concluded the administrative controls are effective in identifying age related degradation, implementing appropriate corrective actions, and continually upgrading the administrative controls used for structures monitoring.

Conclusion

Following program enhancement, implementation of the Structures Monitoring Program will ensure the effects of aging, associated with License Renewal civil commodities, will be adequately managed so that there is reasonable assurance that their intended functions will be performed consistent with the CLB during the period of extended operation.

B.2.32 RG 1.127, INSPECTION OF WATER-CONTROL STRUCTURES ASSOCIATED WITH NUCLEAR POWER PLANTS PROGRAM

Program Description

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program consists of an inspection and surveillance program used to manage the aging effects of the dams and spillways, dikes, canals, reservoirs, and the intake, screening, and discharge structures associated with plant cooling water systems. The HNP Program was developed to meet the requirements of Regulatory Guide 1.127, Revision 1.

NUREG-1801 Consistency

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S7.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Parameters Monitored/Inspected**
  Administrative controls will be revised to document a visual inspection of the miscellaneous steel at the Main Dam and Spillway.

- **Acceptance Criteria**
  Administrative controls that implement the Program will be revised to require evaluation of concrete deficiencies in accordance with the acceptance criteria provided in the corporate inspection procedure.

- **Corrective Actions**
  Administrative controls that implement the Program will be revised to require initiation of a Nuclear Condition Report (NCR) for degraded plant conditions and require, as a minimum, the initiation of an NCR for any condition that constitutes an “unacceptable” condition based on the acceptance criteria specified.

Operating Experience

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is implemented through a corporate procedure as well as HNP site specific inspection and surveillance procedures. These procedures address age-related deterioration, degradation due to extreme environmental conditions, and the effects of natural phenomena that may affect water control structures. The procedures provide periodic monitoring and maintenance of water control structures so that the consequences of age-related deterioration and degradation can be prevented or mitigated in a timely manner. This provides assurance that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program is effectively implemented to meet regulatory, process, and procedural requirements, including periodic reviews; qualified personnel are assigned as program managers, and are given the authority and responsibility to implement the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program; and adequate resources are committed to Program activities.

Corrective actions as a result of inspections performed quarterly and every five years, monitoring of instrumentation readings, and evaluations of the data performed by plant personnel show the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program to be critically monitored, and continually improving. The NRC has audited the Program with satisfactory results. The two items of most importance identified by the NRC were: (1) the removal of vegetation from various areas of the water control structures, and (2) the correction of surface drainage in certain locations to prevent erosive action on elements of the dam. These items were corrected and the process made more formal with the initiation of preventive maintenance inspections at prescribed frequencies.

Based on these results, the Operating Experience provides evidence that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program activities are ensuring the continuing integrity of water control structures.

Conclusion

Continuing implementation of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program, with enhancements identified above, will provide reasonable assurance that applicable aging effects associated with the water control structures are adequately managed so that the intended functions of water control structures within the scope of License Renewal will be maintained during the period of extended operation.

B.2.33 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for the aging management of cables and connections not included in the HNP EQ Program. Accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, swelling, or surface contamination, which are precursor indications of conductor insulation aging degradation from heat, radiation or moisture. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service condition for the electrical cable or connection. The aging effects/mechanisms of concern are as follows:

- Reduced Insulation Resistance
- Electrical Failure

The technical basis for selecting the sample of cables and connections to be inspected is defined in the implementing HNP program document. The sample locations will consider the location of cables and connections inside and outside Containment as well as any known adverse localized environments.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no site-specific operating experience history. However, as noted in NUREG-1801, industry operating experience has shown that adverse localized environments caused by heat or radiation for electrical cables and connections have been shown to exist and have been found to produce degradation of insulating materials that is visually observable.

Conclusion

Implementation of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that the aging effects will be managed such that the components within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.2.34 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS PROGRAM

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is credited for the aging management of radiation monitoring and nuclear instrumentation cables not included in the HNP EQ Program. Exposure of electrical cables to adverse localized environments caused by heat or radiation can result in reduced insulation resistance (IR). A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies. For radiation monitoring circuits and the RG 1.97 wide range neutron flux monitoring circuits, the review of calibration results or findings of surveillance testing will be used to identify the potential existence of cable system aging degradation. This review will be performed at least once every 10 years, with the first review to be completed before the end of the current license term. Cable systems used in excore source, intermediate, and power range nuclear instrumentation circuits will be tested at a frequency not to exceed 10 years based on engineering evaluation, with the first testing to be completed before the end of the current license term. Testing may include IR tests, time domain reflectometry (TDR) tests, current versus voltage (I/V) testing, or other testing judged to be effective in determining cable system insulation condition. The aging effects of concern are as follows:

- Reduced Insulation Resistance
- Electrical Failure

The scope of this program applies to non-EQ cable systems used in process radiation monitoring instrumentation circuits, area radiation monitoring instrumentation circuits, and neutron flux monitoring instrumentation circuits that are sensitive to a reduction in IR. NUREG-1801 Section XI.E1 is not applicable to the cables utilized in these instrumentation circuits.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program consistent with NUREG-1801, Section XI.E2.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program is a new program with no operating experience history. However, as noted in NUREG-1801, industry operating experience has shown that exposure of electrical cables to adverse localized environments caused by heat or radiation can result in reduced IR. Reduced IR causes an increase in leakage currents between conductors and from individual conductors to ground. A reduction in IR is a concern for circuits with sensitive high voltage, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies.

Conclusion

Implementation of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program will provide reasonable assurance that the intended functions of non-EQ electrical cables and connections used in instrumentation circuits with sensitive high voltage, low-level signals exposed to adverse localized environments caused by heat, radiation, or moisture will be maintained consistent with the CLB through the period of extended operation.

B.2.35 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for aging management of cables not included in the HNP EQ Program. In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. Manholes associated with inaccessible non-EQ medium-voltage cables will be inspected for water accumulation and drained, as needed. The manhole inspection frequency will be based on actual field data and shall not exceed two years.

NUREG-1801 Consistency

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E3.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no operating experience history. However, as noted in NUREG-1801, industry operating experience has shown that cross linked polyethylene (XLPE) or high molecular weight polyethylene (HMWPE) insulation materials are most susceptible to water tree formation. The formation and growth of water trees varies directly with operating voltage; for example, treeing is much less prevalent in 4KV cables than those operated at 13 or 33KV. Also, minimizing exposure to moisture minimizes the potential for the development of water treeing.

Conclusion

Implementation of the Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that the intended functions of inaccessible non-EQ medium-voltage cables exposed to adverse localized equipment environments caused by moisture while energized will be maintained consistent with the CLB through the period of extended operation.

B.2.36 METAL ENCLOSED BUS PROGRAM

Program Description

The Metal Enclosed Bus (MEB) Program is credited for aging management of the iso-phase bus as well as non-segregated 6.9 KV and 480 V MEB within the scope of License Renewal. The program involves various activities conducted at least once every 10 years to identify the potential existence of aging degradation. In this aging management program, a sample of accessible bolted connections will be checked for loose connection by using thermography or by measuring connection resistance using a low range ohmmeter. In addition, the internal portions of the bus enclosure will be visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of moisture intrusion. The bus insulation will be visually inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. Internal bus supports will be visually inspected for structural integrity and signs of cracking.

NUREG-1801 Consistency

The Metal Enclosed Bus Program is a new program consistent with NUREG-1801, Section XI.E4.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The MEB Program is a new program with no site specific operating experience history. Industry experience has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Industry experience has also shown that bus connections in the MEBs exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads.

Conclusion

Implementation of the MEB Program will provide reasonable assurance that the intended functions of the iso-phase bus and non-segregated MEB within the scope of License Renewal will be maintained consistent with the CLB through the period of extended operation.

B.2.37 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS PROGRAM

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is credited for aging management of cable connections not included in the HNP EQ Program. Samplings of cable connections within the scope of License Renewal will be tested at least once every 10 years to provide an indication of the integrity of the cable connections. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting loose connections, such as thermography, contact resistance testing, bridge balance testing, or other appropriate testing judged to be effective in determining cable connection integrity. The aging effect/mechanism of concern is:

- Loosening of Cable Connections

The technical basis for the sample selections of cable connections to be tested will be provided. The scope of this sampling program will include electrical cable connections in power and I&C applications, as well as connections in areas with corrosive chemicals, and connections located in outdoor structures with an uncontrolled environment. In addition, the program will include the bolted connections on the overhead transmissions conductors from the high voltage bushings on the main power transformers to the switchyard bus.

NUREG-1801 Consistency

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program consistent with NUREG-1801, Section XI.E6.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program is a new program with no operating experience. However, as noted in NUREG-1801, industry operating experience has shown that circuits exposed to appreciable ohmic heating or ambient heating during operation may experience loosening related to repeated cycling of connected loads or of the ambient temperature environment.

Conclusion

Implementation of the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program will provide reasonable assurance that electrical connections within the scope of License Renewal will be maintained consistent with the CLB through the period of extended operation.

B.3 TIME-LIMITED AGING ANALYSIS PROGRAMS

B.3.1 REACTOR COOLANT PRESSURE BOUNDARY FATIGUE MONITORING PROGRAM

Program Description

The Reactor Coolant Pressure Boundary (RCPB) Fatigue Monitoring Program includes preventive measures to mitigate fatigue cracking caused by anticipated cyclic strains in metal components of the RCPB. This is accomplished by monitoring and tracking the significant thermal and pressure transients for limiting RCPB components in order to prevent the fatigue design limit from being exceeded. The RCPB Fatigue Monitoring Program addresses the effects of the reactor coolant environment on component fatigue life by including, within the program scope, environmental fatigue evaluations of the sample locations specified in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components.” These locations were evaluated by applying environmental correction factors to ASME Section III, Class 1 fatigue analyses, as specified in NUREG/CR-6583,”Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels,” and NUREG/CR-6717, “Environmental Effects on Fatigue Crack Initiation in Piping and Pressure Vessel Steels.” Prior to exceeding the design limit, preventive and/or corrective actions are triggered by the Program. HNP has ensured that the effects of the reactor water environment on fatigue-sensitive locations have been addressed and are managed for the period of extended operation.

NUREG-1801 Consistency

The RCPB Fatigue Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section X.M1.

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the below-listed enhancements will be implemented:

Program Elements Affected

- **Scope of Program**
  Expand the scope of the Program to include: (a) monitoring of selected RCPB components outside of the reactor vessel (including auxiliary system components

such as the pressurizer lower head, pressurizer surge line, and CVCS piping and heat exchanger), and (b) incorporation of NUREG/CR-6260 locations analyzed for environmental effects.

- **Preventive Actions**
  Enhance the preventive actions to include, prior to a monitored location exceeding a Cumulative Usage Factor (CUF) limit of 1.0, evaluation of operational changes to reduce the number or severity of future transients.

- **Parameters Monitored/Inspected**
  Expand the parameters monitored to include monitoring of selected RCPB components outside of the reactor vessel as noted in Scope of Program above.

- **Detection of Aging Effects**
  Enhance the Program to utilize online fatigue analysis software for the periodic updating of cumulative fatigue usage calculations for high fatigue usage RCPB (including auxiliary system) components.

- **Monitoring and Trending**
  Enhance the Program to include: (a) the NUREG/CR-6260 locations that are analyzed for environmental effects, and (b) a description of the use of the online fatigue analysis software for monitoring and trending of cumulative fatigue usage for limiting component locations.

- **Acceptance Criteria**
  Enhance the Program to describe the acceptance criteria for maintaining the fatigue usage below the design code limit, taking into consideration the environmental fatigue effects for the NUREG/CR-6260 locations.

- **Corrective Actions**
  Enhance the Program to address corrective actions if an analyzed component is determined to be approaching the design limit, with options to revise the fatigue analysis, repair, or replace the component.

Operating Experience

A review of NRC Information Notices, Bulletins, and Generic Letters, and the INPO operating experience database was performed, but no applicable operating experience items were identified that relate to fatigue monitoring or to exceeding fatigue design limits since January 1995. The Program has been effective in tracking the high fatigue usage components to ensure that they remain below the design limit of 1.0. Fatigue evaluation of the most limiting locations (i.e., pressurizer surge line, pressurizer lower head, surge line hot leg nozzle, surge line cold leg nozzle, and CVCS cold leg normal charging nozzle) showed that the calculated environmentally adjusted CUF would remain below the design limit of 1.0 for the period of extended operation.

Conclusion

Following program enhancement, the continuing Implementation of the RCPB Fatigue Monitoring Program will provide reasonable assurance that the fatigue design limits for applicable components/commodities will not be exceeded such that the components/commodities will continue to perform their intended functions consistent with the CLB for the period of extended operation.

B.3.2 ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM

Program Description

The HNP EQ Program manages component thermal, radiation, and cyclical aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished or replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for EQ components that specify a qualification of at least 40 years are considered time-limited aging analyses (TLAAs) for License Renewal.

NUREG-1801 Consistency

The EQ Program is an existing program consistent with NUREG-1801, Section X.E1.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The HNP EQ Program has been effective at managing aging effects. As stated in NUREG-1801, EQ programs include consideration of operating experience to modify qualification bases and conclusions, including qualified life. Compliance with 10 CFR 50.49 provides reasonable assurance that components can perform their intended functions during accident conditions after experiencing the effects of in-service aging. The overall effectiveness of the program is demonstrated by the excellent operating experience for the systems and components in the program. In addition, the EQ Program has been and continues to be subject to periodic internal and external assessments that effect continuous improvement. Administrative controls require periodic formal assessments of the EQ Program by knowledgeable personnel from outside the site EQ group.

Conclusion

Continued implementation of the HNP EQ Program provides reasonable assurance that aging effects will be managed such that the components/commodities within the scope of License Renewal will continue to perform their intended functions consistent with the CLB for the period of extended operation.

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APPENDIX C

IDENTIFYING AGING EFFECTS BY MATERIAL AND ENVIRONMENT

Appendix C is not being used in this application.

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APPENDIX D

TECHNICAL SPECIFICATION CHANGES

10 CFR 54.22 requires that an application for license renewal include any Technical Specification changes or additions necessary to manage the effects of aging during the period of extended operation. No changes to the HNP Technical Specifications are required to support the License Renewal Application.

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